

The Mining And Metallurgical Journal

VOL. XX. NO. 7

LOS ANGELES, CAL.,

January 1, 1899,

NEW YORK, N. Y.

Price 15 Cents

Jessop's STEEL

The Best

FOR

Mining Drills,
Tools, Etc.

I. WILLARD BEAM,

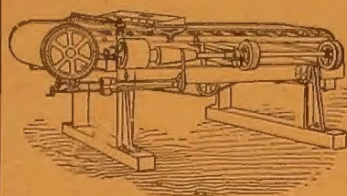
29 Main Street
SAN FRANCISCO, CAL.



The Edward P. Allis Company

MILWAUKEE, WISCONSIN

SEE PAGE 23



Perfect Concentration

Can be Done on an IMPROVED
GATES VANNER. No one has ever
built a better.

Crushers, Rolls, Cyanide and Chlorination Specialties; Gravity Stamps, Steam
Stamps, Smelters. Our Catalogue literature is considered very complete

Gates Iron Works, Dept. 2,

650 Elston Ave., Chicago

THE
ROESSLER & HASSLACHER Chemical Co.

100 William St., New York

CYANIDE

Peroxide of Sodium

Hypsulphite of Soda

Chloride of Lime

Sulphide of Iron



And Other Chemicals for Mining Purposes.

Joseph Dixon Crucible Co.

MINERS, IMPORTERS AND MANUFACTURERS

GRAPHITE & PLUMBAGO

JERSEY CITY, N. J.

RETORTS, CRUCIBLES, GRAPHITE LUBRICANTS, BELT DRESSING,
GRAPHITE PAINTS, LEAD PENCILS, AND GRAPHITE
PRODUCTS OF ALL KINDS.

Send for Production Catalogue.

Graphite Makes the Best Lubricant
and Best Paint.

ADAMANTINE SHOES & DIES

AND

CHROME CAST STEEL

Cams, Tappets, Bosses, Roll
Shells and Crusher Plates.

These castings are extensively used in all the Mining
States and Territories of North and South America. Guarantees
to prove better and cheaper than any others. Orders
solicited subject to above conditions. When ordering send
sketch with exact dimensions. Send for Illustrated Circular.

CHROME STEEL WORKS,

Kent Ave. & Keap St., - BROOKLYN, N. Y.



Stamp Dies



Stamp Cam

The Pelton Water Wheel

Affords the Most Economical and Reliable Power for Mining,
Electric and all other purposes.

9000 WHEELS NOW RUNNING

PELTON WATER WHEEL CO., 121 Main St., San Francisco, Cal.

Mexican, American and Foreign Patents,
TRADEMARKS, ETC.

Reports on Mining and Other Properties.
Proprietors of *Weekly Anglo-American*, a first-class Advertising Medium.
Established 9 Years.

C. H. M. y Agramonte,

P. O. Box 388. Cable Address, "Agra"

CITY OF MEXICO, MEXICO



Machinery and Supplies

OF ALL
KINDS FOR

Mines, Mills, Smelters, Etc.

SEND FOR SERIAL CATALOGUE.

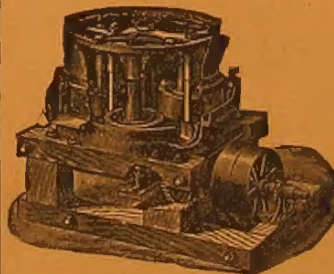
Chas. E. Billin & Co., 1543 Marquette Bldg., Chicago, Ill.

PARKE & LACY COMPANY

21 and 23 FREMONT STREET, SAN FRANCISCO, CAL.

LICENSEE FOR THE MANUFACTURE AND SALE OF

The Huntington Centrifugal Roller Quartz Mill



THE HUNTINGTON MILL is so well and
favorably known among mining men throughout
the world that any description of it would seem
superfluous. They are in use in the United
States, Canada, Mexico, Central and South
America, Australia, China, Japan, and South
Africa. In fact, wherever mines exist, and have
given the best satisfaction of all quartz crushing
mills.

The Construction of this mill has lately been much improved and we claim it to be the
CHEAPEST, MOST EFFICIENT, SIMPLEST, AND MOST DUR-
ABLE MILL UPON THE MARKET.

← CATALOGUE UPON APPLICATION →

OTTO HECKELMANN

FERDINAND McCANN

ASSAYERS AND CHEMISTS

Heckelmann & McCann + + Bullion Dealers

Cash paid for all kinds of Gold, Silver and Ores. All assays
and Chemical Analysis at Mexican Silver Rates, 50
per cent Less than American Price.

PUEBLO DE SAN FRANCISCO No. 6

CITY OF MEXICO

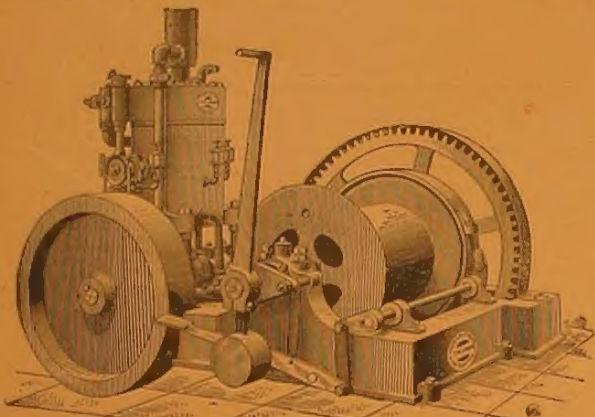
California Vigorit Powder Co.

Manufacturers of

Dynamite High Explosives and "Vigorit Low" Blasting Powder

OFFICE: 208 California Street,
San Francisco, Cal.WORKS: Point Isabel,
Contra Costa Co., Cal.

"Union" Hoist



Union Gas or Oil Engine and Hoist Combined, on strong, iron base.

No Fire No Steam No Boiler No Danger
TEN YEARS' EXPERIENCE. TWO THOUSAND ENGINES IN USE.

Started instantly. Compact, strong, simple, efficient, economical. Perfectly governed, so that oil is used only in proportion to the work done. No expense when idle.

Particularly Adapted to Mining in Localities Where
Fuel and Water are Expensive.

Built in the following sizes:—1 H.P., 4 H.P., 8 H.P., 10 H.P., 15 H.P.,
20 H.P., 30 H.P., 40 H.P.

Send for Catalogue and state what H. P. required.

Union Gas Engine Co.,

301 Howard Street. San Francisco, Cal.

WHITNEY COMPANY

Iron and Steel. Miners, Blacksmiths, Machinists Supplies

Agents for Arizona and New Mexico for Marsh Steam Pump. Agents Hercules High Explosives. Miner's Supplies by car load. Fairbanks-Morse Hoisting Machinery and Engines. Full line of Steam Fittings and ENGINEERS Supplies. A specialty made of Supplying the Mining Trade of the SOUTH-WEST.

ALBUQUERQUE

NEW MEXICO

The only Genuine ALBANY GREASE
has this TRADE MARK on every pack-
age. Look out for Yellow Label.



MANUFACTURERS OF

Albany Dynamo & Albany Cylinder Oils
If you are not using these Oils give them a trial
at once, and we know the result. You will want
no other.

FRANCIS SMITH & CO.,

MANUFACTURERS OF



MINING PIPE ALL SIZES

Hydraulic, Irrigation and Power Plants, Well Pipe, Etc., all Sizes.

Iron cut, punched and formed, or making pipe on ground, where required. All kinds of Tools
supplied for making Pipe. Estimates given when required. Are prepared for coating all sizes of
Pipes with Asphaltum.

46 Fremont Street

San Francisco, Cal.



PEERLESS
SPIRAL PISTON
& VALVE ROD PACKING

THE Peerless Spiral Piston and Valve Rod Packing

Expressly for High Speed Engines. Will Hold 400
lbs. Steam. The best packing for
MINING USES

20 YEARS OLD AND NO EQUAL

MANUFACTURED EXCLUSIVELY BY

Peerless Rubber Mfg Co. 16 Warren St.
New York City

16-24 Woodward Avenue, Detroit, Mich.

202-210 S. Water Street, Chicago, Ill.

Dunham, Carrigan & Hayden Co., San Francisco, Cal.

THOMSON & BOYLE PIPE WORKS

THOMSON & BOYLE CO., Inc.

MANUFACTURERS OF

T. & B.

STEEL MINING PIPE

**Cyanide Tanks, Water Tanks, Air Pipe,
Hydraulic Mining Material**

310-314 Requesena St.,

Los Angeles, Cal.

WILLIAM H. EMANUEL,

REPRESENTING

RAND DRILL COMPANY,
THE EDW. P. ALLIS CO.,

Air Drills and Compressors
General Mining, Milling and Smelting
Machinery and Reynolds Corliss Engine

TRENTON IRON CO.,

Wire Rope and Bleichert Tramways

HENRY R. WORTHINGTON, General Service and Mining Pumps
ROBIN'S BELT CONVEYOR

DENVER

COLORADO

RICHARD L. GOLBURN,

Stock and
Mining Broker

Member of --
Salt Lake Stock and
Mining Exchange

SALT LAKE CITY,
UTAH.

STANDARD BOOKS FOR MINERS.

RECENTLY PUBLISHED.

Five Drainage—Being a complete and practical treatise on direct-acting underground steam-pumping machinery, with a description of a large number of the best-known engines, their general utility and the special sphere of their action, the mode of their application and their merits compared with other forms of pumping machinery. By STEPHEN MITCHELL. Illustrated and many folding plates, 776 pages. PRICE, \$6.00

Earthy and Other Minerals and Mining—A companion volume to "Metalliferous Minerals and Mining." A valuable work, both to the student of Mineralogy and to the manufacturer. By D. C. DAVIES. Second edition, 12mo, 336 pages, 76 illustrations, cloth. PRICE \$5.00

Either of the above books, or any other book, sent prepaid on receipt of price. Send for our large Catalogue of scientific and practical books which we mail free to any address.

NORMAN C. HENLEY & CO.,
132 Nassau Street, New York, City

TRIPP METALLIC PACKING

FOR PISTON RODS

Mining Trade
Solicited

WM. B. MERRILL & CO.,
SOLE MANUFACTURERS

Office and Factory, 290 Congress Street
BOSTON, MASSACHUSETTS

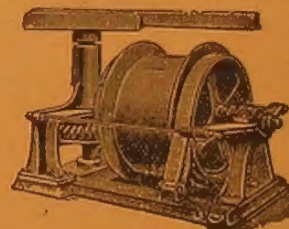
PATENTS!

TOWNSEND BROTHERS
SOLICITORS
OF PATENTS

Patents on Inventions secured in all countries.
Copyrights, Trade Marks and Labels.

Offices, 321 Potomac Block
Telephone 347, Los Angeles, Cal.

EL PASO AUTOMATIC HORSE WHIM



This is the latest improved horse power hoist offered prospectors, possessing all the best features of other styles with improvements added. The end thrust is entirely done away with, thus increasing the efficiency and saving considerable wear. The automatic safety break is so arranged that accident is impossible, being in position until held out by operator to lower bucket. It is made entirely of iron and steel. Weight, about 1,300 pounds. Heaviest single piece, 275 pounds. Price, f.o.b. Colorado Springs, \$90. Cars, Buckets, Rope, Rails, etc.; The Climax Engines. Manufactured by

The Russell Iron Works Co.,

Colorado Springs, Colo., U. S. A.

JOHN STEWART

MINING ENGINEER

Address:—Mining and Metallurgical Journal
LOS ANGELES, CAL.

Examines and Reports on Mineral Properties

ALPHABETICAL INDEX TO ADVERTISERS

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y																																											
Abbott, W. O. 6	Baker & Co. 5	Cal Bellows Mfg Co. 24	Dame, W. E. 5	Baker & Co. 5	California Perforating Screen Co. 24	California Anti-Caloric Co. 24	Davis Iron Works Co., P. M. 5	Baker Iron Works 32	California Wire Works 24	Degen, L. P. 5	Lacy Manufacturing Co. 2	Lambert Hoisting Engine Co. 22	Leffel & Co., James 22	Lehigh University 22	Lexow, Theo. 20	Lidgerwood Manufacturing Co. 20	Link Belt Machinery Co. 20	Lord, Geo. W. 20	Santa Fe Route 20	S. F. Pioneer Screen Works 20	Schoellkopf, Hartford and MacLagen 20	Selby Smelting & Lead Co. 20	Simons & Wainwright 20	Smith, S. J. 20	Smith & Co., Francis 20	Smith & Co., Wm. T. 20	Smith & Thompson 20	Southwestern California Lumber Co. 20	Sprague, Timothy W. 20	S. S. Machinery Co. 20	State Ore Sampling Works 20	Stewart, John 20	Sullivan Machinery Co. 20	Surman & Co., J. H. 20	Tatum & Bowen 20	Taylor & Co., John 20	Taylor Iron and Steel Co. 20	Temple Machine Co. 20	Thompson & Boyle 20	Tomlinson, J. 20	Townsend Bros 20	Tremaine & Froehlich 20	Trenton Iron Co., The 20	Troemner, Henry 20	Union Gas Engine Co. 20	Urle Mining Machinery Co. 20	Van Ande Copper & Gold Co. 19	Van Der Nallien, A. 19	Van Nostrand Co., D. 19	Voll, C. H. 19	Wade & Wade 24	Warren, A. A. 24	Watson, R. N. 24	Weber Gas and Gasoline Engine Co. 24	Weber & Co., F. 24	Weigle Pipe Works 24	Western Chemical Co. 24	Western Forge & Rolling Mill 24	Whitney Co. 24	White Rogers & Co. 24	Wilcox & Rose Co. 24	Wimmer Ged. 24	White Iron Works Co. 24	Wonder Pump Manufacturing Co. 24	Wood, Henry E. 24	Woodbury Concentrator Co. 24	Wawer, I. C. 21
Albion, Wm. 21	Baker & Co. 5	California Perforating Screen Co. 24	Dame, W. E. 5	Baker & Co. 5	California Perforating Screen Co. 24	California Anti-Caloric Co. 24	Davis Iron Works Co., P. M. 5	Baker Iron Works 32	California Wire Works 24	Degen, L. P. 5	Lacy Manufacturing Co. 2	Lambert Hoisting Engine Co. 22	Leffel & Co., James 22	Lehigh University 22	Lexow, Theo. 20	Lidgerwood Manufacturing Co. 20	Link Belt Machinery Co. 20	Lord, Geo. W. 20	Santa Fe Route 20	S. F. Pioneer Screen Works 20	Schoellkopf, Hartford and MacLagen 20	Selby Smelting & Lead Co. 20	Simons & Wainwright 20	Smith, S. J. 20	Smith & Co., Francis 20	Smith & Co., Wm. T. 20	Smith & Thompson 20	Southwestern California Lumber Co. 20	Sprague, Timothy W. 20	S. S. Machinery Co. 20	State Ore Sampling Works 20	Stewart, John 20	Sullivan Machinery Co. 20	Surman & Co., J. H. 20	Tatum & Bowen 20	Taylor & Co., John 20	Taylor Iron and Steel Co. 20	Temple Machine Co. 20	Thompson & Boyle 20	Tomlinson, J. 20	Townsend Bros 20	Tremaine & Froehlich 20	Trenton Iron Co., The 20	Troemner, Henry 20	Union Gas Engine Co. 20	Urle Mining Machinery Co. 20	Van Ande Copper & Gold Co. 19	Van Der Nallien, A. 19	Van Nostrand Co., D. 19	Voll, C. H. 19	Wade & Wade 24	Warren, A. A. 24	Watson, R. N. 24	Weber Gas and Gasoline Engine Co. 24	Weber & Co., F. 24	Weigle Pipe Works 24	Western Chemical Co. 24	Western Forge & Rolling Mill 24	Whitney Co. 24	White Rogers & Co. 24	Wilcox & Rose Co. 24	Wimmer Ged. 24	White Iron Works Co. 24	Wonder Pump Manufacturing Co. 24	Wood, Henry E. 24	Woodbury Concentrator Co. 24	Wawer, I. C. 21

Crude Platinum Purchased.

To Identify Crude Platinum when found, send 75c for Sample in glass, packed in a strong box. We purchase or refine anything containing Platinum.

BAKER & COMPANY.

NEW YORK OFFICE: 121 Liberty Street.

NEWARK, NEW JERSEY



Steel Water Pipe

Well Casing and General Sheet Iron Pipe

OFFICE: Room 3, Baker Block, Works, Cor. New Main and Date Sts.,

OIL AND CYANIDE TANKS

Dealer in CAST IRON PIPE

LOS ANGELES, CAL.

The CALIFORNIA ANTI-CALORIC COMPANY

Steam Pipe and Boiler Covering

Manufactured under our own Patents and solely from California Products.

ANTI-CALORIC PLASTER; the best and cheapest insulating Plaster in the Market.

Factory, Potrero, Tel. Main 5752 OFFICE: 507 Market St., San Francisco

ASSAYERS AND CHEMISTS

Working tests of Ores by all processes. Samples by mail or express collected.

TREMINE & FROELICH,

132 Third St., PORTLAND, OREGON

LEHIGH UNIVERSITY

South Bethlehem, Pa.

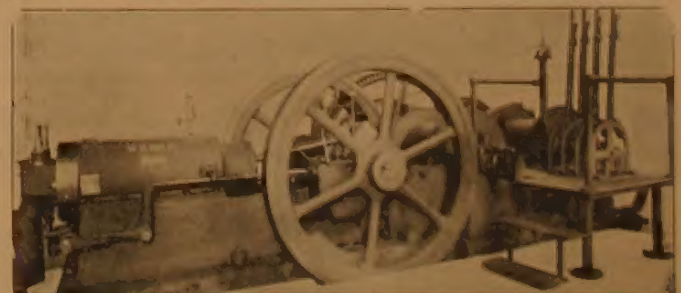
THOMAS MESSINGER DROWN, LL.D., Pres.

Courses in Civil, Mechanical, Electrical and Mining Engineering, Metallurgy and Chemistry. Also Classical and Literary Courses. For further information and for Registers, address, The Secretary of Lehigh University, South Bethlehem, Pa.

Weber Gasoline Hoists

Uses Gasoline, Distillate or Kerosene

Stee 4 to 100 H. P.



This is a 50 H. P. Double Drum Weber Gasoline Hoist now at work at Matehula, Mexico, Hoisting out of a 1400 Shaft.

A Hoist Should be SAFE, SIMPLE, ECONOMICAL

Get a Catalogue and advise us what your requirements are

Weber Gas and Gasoline Engine Co.

434 S. W. Boulevard, Kansas City, Missouri

CHAS. C. MOORE & CO.

ENGINEERS AND DEALERS IN

BABCOCK & WILCOX BOILERS, GREEN'S ECONOMIZERS, WHEELER CONDENSERS, BARNARD-WHEELER COOLING TOWERS, HOPPE'S LIVE STEAM PURIFIERS, McINTOSH & SEYMOUR ENGINES, HAMILTON CORLISS ENGINES, N. Y. SAFETY AUTOMATIC ENGINES, EDMISTON FEED WATER FILTERS, BUNDY STEAM TRAPS, SPENCER DAMPER REGULATORS, HYATT ROLLER BEARINGS, GOUBERT FEED WATER HEATERS, STRATTON STEAM SEPARATORS, SNOW STEAM PUMPS, QUIMBY SCREW PUMPS.

Watch this Space for description of the above Machinery.

19 First Street, San Francisco, Cal.

Send for Catalogue and Full Information.

GOODYEAR'S RUBBER GOODS
— FOR —
Miners and Mining

GOODYEAR RUBBER COMPANY
GATHERING RUBBER, Crack Proof Boots, White Rubber Coats, Oil Clothing

BELTING, PACKING AND HOSE

573, 575, 579 Market Street, SAN FRANCISCO, CAL. **R. H. PEASE,** 73 and 75 First St. PORTLAND, OREGON
Vice President and General Manager.

Chemical Processes Tested and Developed,
Alexander Elliott
Assayer and Analytical Chemist
614 S. Hill St., Los Angeles, Cal.

COMPLETE MINERAL CATALOGUE
156 pages with 40 engravings; contains table giving name, composition and form of all known minerals with other valuable lists and tables. The best book of the kind ever published, for students, prospectors, mining experts, chemists and others. Prices post paid, paper 25c, cloth 50c; call \$1.00. SPECIMENS PURCHASED of Ores or fine crystallization. Correspondence invited. PRICE LIST FREE.
Dr. H. E. Foote, 1317 Arch St. Philadelphia, Pa. Established 1876

JENA Trade Mark
Normal Glass
SCHOTT & GEN.
BEST GLASS FOR Laboratory use

CHEMICALS AND CHEMICAL APPARATUS

ASSAY BALANCES
Finest Ever Made

Specialties:—Analytical Portable Balances, Porcelainware, Platinum goods, Crucibles, Cupels, Scorifiers, Muffles, Furnaces, C. P. Acids, etc.

Everything Necessary for Assayers

Elmer & Amend,
3d Ave. Cor of 18th St. New York

WOODBURY CONCENTRATOR



No. 121 First St., - San Francisco

FOURTH EDITION
Large 8vo., cloth, 700 Pages and Numerous Plates, \$5.00

The METALLURGY OF GOLD
A PRACTICAL TREATISE ON
The Metallurgical Treatment of Gold Bearing Ores.

Including the Processes of Concentration and Chlorination and Extraction of Cyanide and the Assaying, Melting and Refining of Gold.

By **M. EISSLER, M. E.**
Fourth Edition, Revised and Enlarged to 700 Pages. With 25 Additional Plates, and Working Drawings and Chapters on Recent Milling Operations in the Transvaal.

D. VAN NOSTRAND CO., Publishers
23 Murray and 27 Warren Sts., New York
Copies sent by mail on receipt of Price

MATHISON & CO.
29 LIBERTY ST., NEW YORK CITY

ANTIMONY

BUY —
ANTIMONY ORES AND
CRUDE ANTIMONY

* WRITE FOR FULL PARTICULARS

The Colorado and California Mineral Developing Company
432-3-4 STIMSON BLOCK, LOS ANGELES, CAL.

Prospecting, Developing of Mines, Mine Operators, Locating, Buying and Selling of Mines a Specialty, Financial Agents for Eastern Capitalists.

GAIL BORDEN, President
J. A. COMER, Vice-President
J. E. HAWK, Secretary

CAPITAL STOCK, \$200,000
Correspondence Solicited

ELECTRICAL FUZES



BLASTING MACHINES
LEADING WIRE
CONNECTING WIRE

THE AETNA POWDER CO.
188 MADISON STREET
CHICAGO ILL.

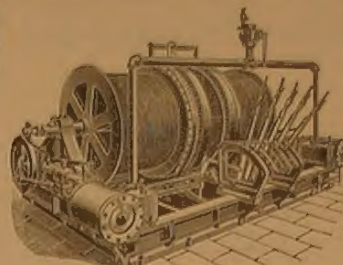
Send for our Illustrated pamphlet

A NEW MORTAR
That is a crusher and pulverizer combined.

Weight 110 lbs.; Diameter 10 1/2 in.; Height 8 1/2 in.
Fills a long-felt want. Send for descriptive circular. Crusher Pulverizer No. 1, \$25.00.
J. E. Surman & Co., 74 Cortlandt St., New York

Lidgerwood Hoisting Engines

Built to gauge on the Duplicate Part System. Quick Delivery Assured.

**Mine Hoists, CABLEWAYS**

Conveying Devices, for Mining, Quarrying, Logging, Dam Construction, &c.

Electric Hoists and Appliances

Lidgerwood Mfg. Co.

HENSHAW, BULKLEY & CO., Agents, San Francisco.

New York

STEEL CASTINGS

From 1 to 40,000 pounds weight

Of Open Hearth or Chester Steel. True to Pattern, Sound, Solid. Gearing of all kinds and Crank Shafts. Shoes, Dies, Crusher Plates, Bosses, Tappets and Roll Shells. Steel Castings of every description.

Chester Steel Castings Co.,

Works Chester, Pa. Office, Library St. Phila., Pa.

**UNFAIR COMPETITION**

Our recent announcement that inferior goods had been sold and billed on the Coast as our goods, and that our trademark numbers had been counterfeited, has disclosed an even greater extent of these practices than we had supposed to exist. To make the resulting damage to the reputation of our goods as small as possible and to protect our would-be patrons we repeat:

All our catalogue goods, except those listed by us as manufactured by others, are stamped with our name "Keuffel & Esser Co." or our initials "K. & E. Co.," and where there is room for it, with our trademark.

We never stamp our goods with catalogue numbers. Our goods so stamped are therefore not ours. All our goods are fully warranted to conform to the description we give of them in our catalogue and to be of the quality and grade specified. We make some lines of cheaper goods for the jobbing trade, but they differ from our catalogue goods in quality and appearance. These inferior goods are not stamped with any of our trademarks. Our catalogue goods are not furnished to any dealer or agent without our complete stamp as described above, and any claim that we furnish our catalogue goods by special arrangement without our stamp is therefore an attempt to deceive. Our special papers in rolls or sheets

Duplex Universal Anvil Baragow Normal

are watermarked or stamped along the edge with their name. Any claims that our papers are furnished by us in bulk without these names or that these papers have been obtained otherwise than through us, are absolutely false. We will thankfully accept any information bearing on the counterfeiting of our trademark numbers or the palming off of other goods as ours.

Very respectfully, KEUFFEL & ESSER CO., New York

*** SCHOOL OF ***

Practical Mining, Civil, Mechanical, Electrical Engineering, Metallurgy, Cyanide Process, &c.

Surveying, Architecture, Drawing and Assaying. 933 MARKET ST. SAN FRANCISCO, CAL.

OPEN ALL YEAR

A. VAN DER NAILLEN, President. Assaying of Ores, \$25; Bullion and Chlorination Assay, \$35; Blowpipe Assay \$10. Full Course of Assaying, \$50. Established 1864.

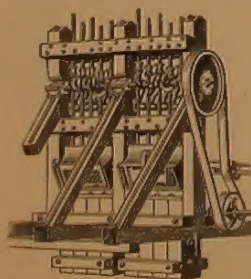
Send for Circular

The F. M. Davis Iron Works Co.

Office and Works 723 to 743

LARIMER STREET.

Corner 8th Street, DENVER, COL.



Our Stamp Mills from 500 lbs. to 1,000 lbs. Stamps are strictly up to date. Furnished with Steel or Semi-Steel wearing parts, heavy mortars of late improved design, with or without steel linings, as desired, and the Davis Patent Self-Tightening Cam of High-Grade Open-Hearth steel, and High-Grade Forged-Steel Cam Shafts and Stems.

They are designed with great care by engineers familiar with the best previous practice and knowing just what is wanted to render satisfactory service.

Send for Catalogue and Prices.

OUR New Book**ESSAYS UPON**

Boiler Incrustation and Corrosion. Boiler Explosions, The History of Natural Water Contamination.

BY GEO. W. LORD, is now ready

We will send this interesting little book free of cost to

EVERY SUPERINTENDENT OR ENGINEER

Who will state his occupation, By whom employed. Total Boiler capacity. What Scale preventive he is using. The cost of the article. And how long the supply will last. Address

Geo. W. Lord,

Philadelphia Pa.

The Baker & Adamson Chemical Co.

MANUFACTURERS OF

Strictly Chemically Pure Acids and Chemicals and Ashless Filter Papers

EASTON.

PENNSYLVANIA

J. B. TOMLINSON, M. E.

Prescott, Arizona,

MINING PROPERTIES EXAMINED, AND PRAISED AND REPORTED UPON

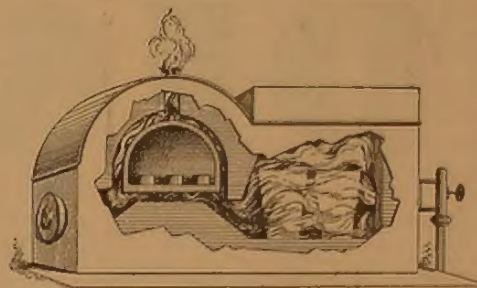
— AND —

Supervision taken of the development of prospects and the operation of mills.

FOR SALE!

One 36"x24" Water Jacket Furnace, Boiler, Engine Blower, Rock Breaker, Scales, Shafting, Pulleys, Belting, Tools and all fittings and fixtures complete and new, built by Frazer & Chalmers; also one 16x42 Hamilton Corliss Engine; one 12x20 double Cylinder Hoisting Engine. Will be delivered f. o. b.

W. E. DAME, CERRILLOS, NEW MEXICO

Combined Melting and Muffle Furnace.

Both furnaces always hot and ready for use. One burner suffices. A saving of one-half in fuel used. Compact and convenient to transport to and from mines and on prospecting trips. Furnace revolves on a pivot. After making one melt with burner inserted in melting end reverse furnace, insert burner in muffle end and you are prepared to continually melt and cupel without further disturbing furnace. A special feature of this is the oxidizing bonnet (not shown in illustration) by which a continuous flow of fresh air, controlled by a damper, is passed through the muffle.

For Sale by

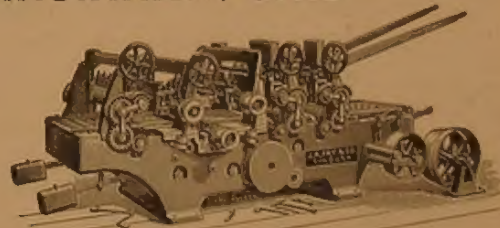
B. M. CALKINS CO.,

Assayers and Chemists, Refiners and Bullion Buyers.

127 West First Street,

LOS ANGELES, CAL.

J. A. FAY & EGAN CO.
CINCINNATI, OHIO

Wood Working Machinery

— FOR —

Box Factories, Planing Mills, Sash, Door & Blind Factories Carriage, Wagon and Agricultural Shops.

HENSHAW, BULKLEY & CO., Agents,

San Francisco, Cal.

Link Belt Machinery Co.

ENGINEERS, FOUNDERS, MACHINISTS

Designers and Builders of

CHICAGO, U. S. A.

LINK BELT Elevating and Conveying Machinery for Handling

Hot roasted Ores, Slag, Matte, Coal, Cement, etc., Electric Coal Mining and Haulage Machinery, Shafting, Pulleys, Bearings, Rope Sheaves, etc. Machinery designed and erected to suit existing conditions and available space.

Denver, Colo., 1328-17th St.





The Gold and Silver Extraction Co.

OF AMERICA, Limited

Capital \$550,000

The Original Cyanide Process, Simple, Reliable, Economical
Mine owners and others having Refractory and Low Grade Gold
and Silver Ores and Tailings should have their material tested by
THE MACARTHUR-FORREST PATENT CYANIDE PROCESS.
Samples assayed and fully reported upon. Properties examined.
Designs furnished. Particulars upon application.
GEO. A. ANDERSON, Gen. Mgr. J. STANLEY MUIR, Technical Mgr.

210 McPhee Building, Denver, Colorado

Information, estimates, etc. cheerfully given. JESSE J. MacDONALD, Agent,
Broadway Hotel, Los Angeles, Cal.

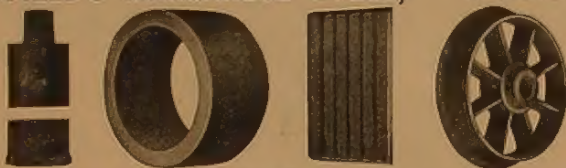
Miners Attention!

We Sell Powder, Caps, and Fuse, Mining Machinery, Belting, Asbestos
Goods, packing of all kinds, Picks and Shovels, Iron and
Steel; Iron Wheelbarrows, Ore Sacks, Tents, Portable Forges
and General Mining Supplies. Agency Truax Mfg. Co and
Studabaker Wagons.

WILCOX & ROSE CO.,

San Bernardino, Cal.

HADFIELD'S MANGANESE STEEL, HARD, TOUGH.



Best Metal known for Stamp Shoes and Dies, Roll Shells, Crusher Plates and Side Liners. Toggles
and Toggle Bearings, Gyroscopic Cones and Concaves or Liners, Mine Car Wheels, Coal Crushing
Rolls, Etc., Etc.

TAYLOR IRON AND STEEL CO.,

Sole Licensees in America under Hadfield System and Patents.

High Bridge, N. J., U. S. A

All Pacific Coast parties interested please address, Parks & Lacy Co., San Francisco, Cal.

KEUFFEL & ESSER CO.
NEW YORK.
127 FULTON AND 42 ANN STS.
Branches: 111 Madison St., Chicago; 708 Locust Street,
St. Louis, Missouri
Drawing Materials and Surveying Instruments
largest and best assorted stock in America. All re-
quisites for field, mine, and draughting room. We
have made a study of this line, and our goods are war-
ranted to be as nearly perfect as it is possible to make
them. Prices reasonable. Write for catalogue.

MINING MACHINERY.

If you want mining machinery of the
first class address the MINING AND MET-
ALLURGICAL JOURNAL, stating the pur-
pose to which it is to be applied, and you
will be placed in communication with
the leading manufacturers of repute. All
the latest catalogues of mining machinery
are kept constantly on hand.

Simson Block, Los Angeles, Cal.
150 Nassau St., New York, N. Y.

Fred. F. Hunt, E. M.

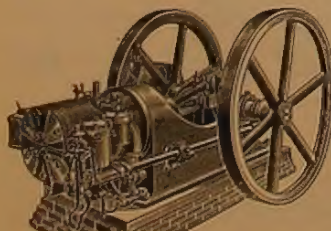
Chemist and Assayer

Weighing, Sampling and Assaying all Mineral
Products
Specialties: Lead, Bullion and Umpire Assays
Samples by Mail or Express.

77 Pine Street, New York City

See Incorporated Mines
Paying Dividends page 22

LAMBERT Gas, Gasoline and Distillate Engines



230 East Fourth Street,

TANKS, PIPE and WATER
SUPPLY GOODS PUMPS
of all kinds.

Call on or Address,

S. J. Smith,

LOS ANGELES, CAL.

SIMONDS & WAINWRIGHT, Chemical and Mining Engineers and Analysts

Working tests of Ores by all Processes. Ex-
perimental Work on Chemical and Metallurgi-
cal Processes. Instructions in Assaying and
Chemistry.

No 20 Platt Street New York

SAVE MONEY! FUEL COSTS MONEY



Protect your pipes and boil-
ers with Wm. Berkfeld's Fos-
sil meal composition, packed
in sacks, easy to transport
anywhere. Send for facts
and figures.

FOSSIL MEAL CO.,
2 Cedar Street, New York

ASSAYER and CHEMIST

Mark samples plainly, advise by letter
of full details, with charges enclosed.
Postage on ore one cent per ounce.

C. H. VOLL,

34 Roxwell Bldg.

SEATTLE, WASHINGTON

Mining Supplies and Steel

Blacksmiths and
Machinists Supplies
of all kinds.

Iron and Heavy Hardware, Wood
Materials, Wheels, Hardware &c., for
heavy freight wagons. Blacksmiths
and Wagonmakers Tools and Ma-
chines. Send for complete catalogues.

S. D. KIMBARK,

80-82-84 Michigan Ave.,

Chicago, Ill.

W. O. ABBOTT, ASSAYER

ASSAYING IN ALL ITS BRANCHES
CHEMICAL DETERMINATIONS ACCURATELY MADE

TOMBSTONE - - - ARIZONA

KEYSTONE LUBRICATING GREASE

The only grease ad-
apted to all tempera-
tures. It will not
splash or drip like
oil.



Our goods are not for
sale by the Jobbing trade
If you want the genuine
Keystone Grease it can
only be obtained from us.

A full set of brass cups furnished FREE on first purchase

Especially adapted for Air Compressors and all kinds of Machinery in connection
with Mines, Mills and Smelters. Send for trial sample and
Cup Free of Charge.

Keystone Lubricating Co. 20th - Allegheny Ave.
Philadelphia, Pa.



The Harrington & King Perforating Co.

127 N. Union St., Chicago Ill.

Eastern Office, 284 Pearl St., New York

The Mining And Metallurgical Journal

ENTERED AS THE POST OFFICE AT LOS ANGELES, CALIFORNIA
AS SECOND CLASS MAIL MATTER.

VOL. XX. JANUARY 1, 1899. No. 7.

F. W. EDELSTEN, Editor.

O. S. BREESE, Business Manager.

JOHN STEWART, Special Contributor.

ULRICH KNOCH, Publisher

MAIN OFFICES

Stimson Block, Los Angeles, Cal.

150 Nassau St., New York, N. Y.

BRANCH OFFICES:

San Francisco, Cal.	64-65 Merchants Exchange
Chicago, Ill.	413, 59 Dearborn St.
Denver, Colo.	402-403 Quincy Bldg.
Salt Lake City, Utah	15 W. Second South St.
Spokane, Wash.	Hypothec Bank Bldg.
City of Mexico, Mexico	No. 4 Calle de San Juan de Letran

SUBSCRIPTION PRICE:

For United States, Mexico and Canada	\$2.50 per annum
" " " " " "	1.25 six months
All other countries in the postal union	3.50 per annum
" " " " " "	1.75 six months

ISSUED SEMI-MONTHLY

ADVERTISING RATES FURNISHED ON APPLICATION.

The *Engineering and Mining Journal*, under date of 6th November, publishes the following, which needs no further remarks:

"Our Californian contemporary, the *Los Angeles Mining Review*, finds fault with us, and we are obliged to confess that it has some grounds for complaint, because we gave credit to the MINING & METALLURGICAL JOURNAL, also published at Los Angeles, as the source of our information concerning the Stephens process. We are exceedingly sorry for this mistake, of which we were inadvertently guilty, and we make haste to tender a thousand apologies to the *Los Angeles Mining Review*. We are quite ready to give it all the credit it can desire for fathering the Stephens process, to which we shall revert in an early issue. We desire also to tender our apologies to the *Los Angeles MINING & METALLURGICAL JOURNAL* for imputing to it, even inferentially, any serious attention to the Stephens process."

ENCOURAGE DEEP MINING.

In the Transvaal, of South Africa, where the deposits of gold bearing, brecciated conglomerate dip at an angle from the horizontal, it has been demonstrated that the vertical side line boundary is a condition imposed on the mine owner, which is not in the interest of labor and capital invested in deep mining. This condition, combined with the fact that in that country there are many American mining engineers of long experience operating the mines, who have been accustomed to a more just system of following the dip of the deposit as practiced in the Western States, has caused a change of opinion in regard to the limits put on deep mining, by adopting a farmer's surface boundary for underground mining conditions. These circumstances have made the British South Africa (Chartered) Company adopt a better system for regulations governing mining operations within their concession of mineral territory. As in the Western States, the miner is to be encouraged by allowing him to follow the dip of his deposit, and thereby protect capital

invested in the early stages of development of the mines of the country. This is a sad blow to the desires of a few well-meaning but inexperienced parties, who desire to have a change made in the just law encouraging deep mining in the Western States. If these regulations also provide for a Commissioner of Mines and Court of Arbitration, to investigate and settle on the ground all mining disputes between adjoining owners, and thereby keep mining lawsuits out of courts, and the manipulation of a horde of hungry lawyers, then there will be short and speedy justice administered in such cases.

The laws of any country must be framed to encourage the operations of deep mining, and not impose surface conditions, which restrict industry of the miner and are not a just condition to regulate underground work, or in the interest of capital already invested in mining enterprises.

DUMP OR STOCK PILE.

In parts of the Western States, the term dump is too often applied to a stock pile of ore which has been placed there for want of concentrating plant or other good reason. Whereas, the use of the word dump ought only to be used for the place where refuse rock is thrown. It is a fortunate condition of affairs at any mine where there is no dump or waste mined, and that term has to be applied to a pile of ore. To the eastern miner this wrong use of the word causes astonishment or a broad smile at the ignorance of the party using it. The miner who sends a carload of ore to the dump, instead of to the stock pile or ore bins, in an eastern mine, would not be liable to do it a second time; but then, our western mines are so rich that they have only a pile of ore which they call the dump. The economical practice of dumping waste into the abandoned workings of the mines is not a common practice of the Western States, but is the best way of disposing of refuse, and having the double benefit of making such parts of the mine secure against falls of wall rock.

STATUS OF THE MONEY QUESTION.

The President, in his Message to Congress, had little to say with reference to monetary legislation. The only specific recommendation he made is that the law be so changed that when the greenbacks are received by the treasury they shall not be reissued except for gold. If this were done, it would amount to their retirement as fast as taken in, for there can be no appreciable advantage in buying greenbacks with gold, which can perform no greater function. There is convenience in the use of paper money it is true, but banknotes and silver certificates can be obtained more easily than greenbacks could be made the proposed change.

Mr. Secretary Gage, in his report, reaffirms the views he promulgated a year ago, which embrace the permanent retirement of the greenbacks through interest-bearing bonds. It will be observed that the President's recommendation is in line with the Secretary's scheme. Their retention, when taken in payment of taxes will deplete the resources to the extent they are thus employed, which would cause a deficit, to be made up by the sale of bonds. Practically, the President's recommendation would come to the same result finally, though indirectly, as that which Secretary Gage would accomplish directly.

Should Congress adopt the President's re-

commendation, it may be regarded that the disappearance of the greenbacks from circulation would be a matter of brief time only. With them out of the way, the door would be open for the substitution of bank currency, which Mr. Gage would have done, and then his proposition to get rid of the silver dollar would alone be left to be pressed to adoption. That being achieved, our money would be gold coin, bank notes, and subsidiary silver coin, making gold the only legal tender.

Mr. Gage in his last report urges the adoption of his views with the same firmness as in his first. Circumstances have not wrought any change, nor lessened the energy with which he presses them. The Bankers' Alliance vigorously stands behind the Secretary, and is ready to exert its influence upon Congress. The President is timid, or proposes to adopt shrewd management in aid of Mr. Gage's radical plans.

It is improbable that an attempt will be made in the present session of Congress to enter upon a radical revision of the money system, both for want of time, and the reason that a revision on the lines laid down by Mr. Gage can not pass the Senate. Possibly, there may be an effort to enact some changes as entering wedges, in preparation for what will be urged by the Secretary and the Bankers' Alliance in the next Congress.

The contest over the money question is certain to take place during the next Congress, of which the Republican party will be in control in both branches, whether the full measure of Mr. Gage's views will be agreed upon cannot be foretold, but the administration will, doubtless, have a plan, in support of which its press will be rallied. It must do that or it cannot go before the country in 1900 with any prospect of success, if it is aimless upon a question in which the country is so deeply interested, defeat is its certain doom.

It is improbable, however, that the President would call an extraordinary session of Congress to merely dispose of the money question; but conditions growing out of the war with Spain indicate that such a session is probable, and it almost seems inevitable. If such a session be not called, uncertainty as to what the final policy will be will hang over the country for the next fifteen to eighteen months.

THE HIGHEST POSSIBLE.

The largest percentage of metal which an ore can contain varies with the nature of the mineral or minerals, containing that metal, of which the ore is composed; but for a given mineral, in its state of absolute purity, the percentage of the metal is, theoretically, always the same. This fact is frequently unknown to the tenderfoot prospectors and mining men. We will here try to make the question of "the highest possible percentage" of metal in an ore more clear to the unsophisticated.

Ores contain the different metals, either in their native state, as gold, silver, platinum, lead, copper, antimony, mercury, etc., in which case they are said to be free; or the metals may be chemically combined with oxygen alone, such as copper in cuprite and melaconite, iron in red hematites, specular iron, magnetite, olivite, etc.; they are then called in chemistry oxides. Or else again the ore may contain the metals chemically combined with sulphur, such as chalcocite (copper sulphide), pyrites (iron sulphide), galena (lead

sulphide), cinnabar (sulphide of mercury), etc., etc., etc. The ores may also contain the metals combined with chlorine, tellurium, sulphuric, carbonic or silicic acid, etc., etc., etc. There are a great many more combinations which it is unnecessary to mention in mention in this article.

Now then if one ore (say a copper ore) contains besides the gangue, chalcocite or copper sulphide, then, as pure chalcocite is composed of 79.8 per cent. copper and 20.2 per cent. sulphur, it naturally follows that the highest possible percentage of copper in this ore would be 79.8 per cent., which would only be true if there were no gangue mixed with the copper mineral.

Following up this same way of reasoning, we would find that pure cuprite or red oxide of copper could not contain more than 88.8 per cent. copper (the balance, 11.2 per cent., being oxygen). Or again, if our ore were pure chalcopyrite (combination of copper, iron and sulphur), then its highest possible percentage in copper would be 34.6 per cent., the balance of the mineral being, sulphur 34.8, iron 30.5.

The percentage in metal of a few of the commonest minerals that a prospector or mining man may come across, might be useful to some of our readers, and we here give it:

Magnetite (magnetic iron ore).....Iron,	72
Hematite (red oxide of iron)..... "	70
Iron pyrites..... "	46.6
Cuprite (red oxide of copper).....Copper,	88.8
Malachite (green carbonate of copper)..... "	57.4
Azurite (blue carbonate of copper)..... "	55.2
Chalcopyrite (copper pyrites)..... "	34.6
Galena (lead sulphide).....Lead,	86.6
Zinc blend (zinc sulphide).....Zinc,	67

To further benefit some of our readers we will add to the above little exposé and list, that should they be, for instance, in the desert and far from any assay office, and should they come across a piece of ore containing a mineral which by their previous experience they know to be *galena*, their next question is: What per cent. of lead does it carry? The intelligent man can then break up the piece to the size of a nut, and with a little practice can guess reasonably close what is the proportion of *galena* and of gangue in the sample considered. Let us suppose that he considers that there is about 3 parts of gangue and 1 part of *galena* in the total 4 parts of rock; he has then but to reason as follows: If the 4 parts (or the whole of the specimen) were pure *galena*, the percentage of lead would be 86.6; but of the 4 parts in this case only 1 part (or a quarter) of the specimen is *galena*; then the percentage of lead should be approximately $\frac{1}{4}$ of 86.6, or 21.6 per cent. Of course this is very rough, but if the prospector then has his sample run for lead by some reliable assayer, it would be but a very short while before his eye would become accustomed to judging very near to the reality.

GEOLOGICAL SURVEY OF KANSAS.

Through the courtesy of Professor Erasmus Haworth of the University of Kansas we are in receipt of four large handsome volumes of the University Geological Survey of Kansas.

VOLUME I.

Treats of the stratigraphy of the Carboniferous of Kansas, also a preliminary report on the Oil and Gas in Kansas, and Preliminary Catalogue of the Paleontology of this period.

The text is illustrated by twelve figures and also by thirty-one plates.

VOLUME II.

Reports on the stratigraphy and general geology of Western Kansas, including the Upper Permian, the Cretaceous, and the Tertiary. Illustrations include thirteen figures in the text and forty-eight plates.

VOLUME III.

Special Report on Coal, with fifty-four figures in the text and seventy plates.

VOLUME IV.

Contains the first part of Professor Samuel W. Williston's report on the Paleontology of Kansas. The volume is dedicated to the memory of Professor Benjamin F. Mudge, the first geologist of Kansas, of whom the author presents a photo, and pays a high tribute to his memory, as an excellent teacher, a faithful friend, and an honest man. This volume has as a Frontispiece, Reptiles of the Kansas Cretaceous Ocean, from a painting by J. Carter Beard, which has been for the most part based upon the restorations of this volume and others published by the author, and contains one hundred and twenty plates.

The whole of the series of volumes are uniform in size and printed in large, clear type, with wide margin, which in a scientific and reference work of this kind is useful for the reader's or student's private notes or remarks. Another desirable feature is the binding with each volume of the sections and plans, figures and plates which illustrate each volume and form an appendix to each. A complete index is given at the end of each volume, a rare feature in American works. From the large number of species of fossils collected, the stratigraphy of the rocks described seems to have been worked out with care, as their collection is proof of the intimate acquaintance of the author with his subject, and that the work was not done in a superficial, "walk over the country," but was conducted in a systematic and thorough manner, which can only be accomplished by much hard work and is only undertaken by such as have a thorough love of the work involved, both in the collecting and classification of the results. Although ample justice has been done to the scientific part of the geological examination of the rocks of Kansas, the economic and commercial development of the mineral resources of the State are illustrated and described by the methods of operating the mines and the classes of machinery employed, together with statistics of coal and coke, and mine directory by W. R. Crane; table of mines, showing the depth of shafts, grades of coal, strata, etc.; table of machinery, and the mining laws, rendering Volume III. of special interest to coal miners and engineers outside the limits of the district described. In future volumes it is to be hoped that the other industries, such as oil, cement, gypsum, lime, etc., will receive the same care and attention. Geology as a science pure, study, has interest for a few, and for that reason the commercial application of geological knowledge has an important bearing on the development of the mineral resources, to make them known to capital and labor. Volume IV. contains a page of the past life history of the earth which Moses and the Prophets neglected to mention, but although Moses was the first miner on record, the author has gone to the trouble to write the history of paleontological research in Kansas as far back as records go, which is a task requiring much research, as well as contributing original matter to the legend. From a scientific and educational standpoint, this handsome volume has special

interest, and reflects credit to the State of Kansas, the University, and to the authors of it. The mining interests of Kansas, although not of great diversity, will receive notice by the continuance of the work already commenced in these volumes, by future publications which will cover the whole field.

CORRESPONDENCE

NEW MEXICO.

Electric Smelting.

In your issue of December 1st, you refer to an inquiry concerning the use of electricity as an agent in heating for an assay furnace, and incidentally refer to Ahearn's methods of electrical heating.

As one having had extensive experience in the use of electric current for heating and metallurgical purposes, I may be permitted to make some remarks upon the subject. If they answer your correspondent's purpose, or serve to enlighten your general reader, I shall be pleased.

Ahearn's, and all the other electrical heating devices, so extensively used in the heating of street cars, cooking utensils, etc., convert the electrical energy into heat, by sending the current through a resistance, consisting of iron, german silver, or other wire or strips of high resistance. Their patents are based upon the various methods of insulation and protection of the coils from oxidation effects of the atmosphere. One of the earliest was Burton's, consisting of a simple iron wire, zigzagging across a frame, which was then buried in powdered fire clay. It made a very good and effective heater.

But none of these devices could possibly produce a temperature suitable for smelting purposes, as the wires being themselves metal would also melt.

The neatest way to smelt electrically consists in using black lead or plumbago crucibles, which being conductive to the electric current, and of high resistance, may be made the means of producing the heat within themselves. It is simply necessary to stand the pot on a heavy copper plate connected to one pole of a dynamo, another copper plate acting as a cover for the pot, which should fit neatly, and to which the other pole of the dynamo is attached.

Of course, anyone conversant with electrical matters understands that the heating effect is a result of the quantity of current sent through more than of the pressure or voltage. It therefore becomes necessary to have a current of high amperage and low voltage. If an alternating current be available, this is readily obtainable by means of a special transformer. The welding outfits of the General Electric Co. are available for this work, the plumbago pot taking the place of the piece to be welded.

I have smelted in such a pot with direct current by placing the pot in series with the lighting system of lamps (incandescent) and varying the current by turning lights on or off. Magnetite, otherwise infusible, may be melted in this way. In such smelting as I have described the heating of the charge is by radiation, the same as in a muffle furnace.

Moisson, the French experimenter, uses more largely, I believe, the pot as one pole and a thick carbon rod immersed in the charge as the other pole. In this case the charge if not conductive, must be made so by the addition of charcoal powder.

Very truly, MARCUS RUTHENBURG, E. E.
Silver City, N. M., Dec. 12, '98.

MOUNTAIN BEAUTY MINING CO.

One of the recent incorporations in Los Angeles, Cal., in a mining way, was the incorporation, November 18th, under the laws of California, of the Mountain Beauty Mining Co., with properties at Oak Grove, San Diego county, Cal. The capital stock has been placed at the exceedingly reasonable figure of \$250,000, and has a par value of \$1.00. The stock is fully paid and non-assessable.

The general office of the company is at present in the Homer Laughlin building, and the directors and officers are as follows: E. H. Little, president and manager, a thoroughly practical miner and business man; J. A. Shelhamer, vice-president; F. J. Eddy, secretary and treasurer; E. H. Caner, and H. A. Perkins.

The properties of the company, as afore mentioned, are located near Oak Grove, San Diego county, Cal., at an altitude of 5,500 feet, with an excellent climate summer and winter, and plenty of wood and pure water; it is estimated that from fifteen to twenty-five inches of water can be made available for power purposes, with a fall of about 300 feet. They consist of the Mountain Beauty, Beauty's Annex and Jesse L. gold mines.

The country rock is granite and syenite, with mica schist running with vein; large dykes of granite and porphyry are running parallel with all of the veins, forming contacts in which the ores are found. The Mountain Beauty mine is well defined, and the croppings, which average six feet in width, prospect the entire length of the claim, 1,500 feet. A drift has been run in thirty feet with the lead, following the foot wall, and a cross-cut run twenty feet all in pay ore. At the junction a chamber has been made and a five by six foot shaft, following foot wall, has been sunk between twelve and fifteen feet, with a five foot vein of ore. Another tunnel is in nearly 100 feet, and is about 135 feet lower than the first. It is proposed to run this tunnel 1500, and the system of development work mapped out by the directors will place the mine in a condition to properly extract the ore at a minimum of cost.

The ore is free milling quartz, of a rosy hue, and from 100 to 125 tons are on the dump at present.

The Beauty's Annex and Jessie L. mines run parallel with and adjoin the Mountain Beauty mine on the east. These veins will

average $3\frac{1}{2}$ feet in width on the surface, are well defined, in same formation as the Mountain Beauty and prospects from wall to wall.

An important fact noticed in the formation of this company is that the directors are not paid for their services while acting as such.

One of the officers stated the other day that the first block of 5,000 shares, had been sold at 40 cents per share, and that the second was now on sale at the same price. The second block will place sufficient money in the treasury to prosecute the necessary development work, which will be pushed vigorously.

The Pioneer Mutual Mining & Exploration Co. is the name of a corporation backed by such men as Fred. K. Rule, the treasurer of the Los Angeles Terminal Railway Co.; F. P. Flint, United States District Attorney; A. C. Jones, of the Los Angeles Furniture Co., N. F. Wilshire; A. C. Harper, of Harper & Reynolds Co., O. Pooley and H. M. Russel, mining men of note; H. J. Fleishman, the cashier of the Farmers' and Merchants' Bank of Los Angeles, and L. M. Gregory, the agent for the Washington Life Insurance Co.

The following officers were elected for the first term. Fred. K. Rule, president; A. C. Jones, vice-president; O. Pooley, secretary; H. J. Fleishman, treasurer; F. P. Flint, attorney; Chas. Kowdy, manager of agencies.

The corporation has capital stock of \$10,000,000, and was incorporated under the laws of Arizona.

The objects of the Pioneer Mutual Mining and Exploration Co. are to give an opportunity to invest in a general mining business, conducted on the safest basis, by contributing small monthly installments, to add the profits to the amount paid in, until each share is worth \$50, and to participate after maturity in such dividends as may be apportioned annually by the Board of Directors.

Further, to develop properties against a certain interest, or to bond such properties. To buy or sell mining properties, and to invest in such manner as deemed advisable by the Board of Directors and mining experts. This will give any one with a monthly investment of 50 cents per share an opportunity to participate in selected, A No. 1, mining properties, and not only in one but in a number of them, so that the chances of losses are reduced by the law of average to a minimum, while one good mine can easily yield returns that will mature the stock in a very short time. This plan will make the investor, sooner or later, a partner in very desirable mining properties, which by individual effort one may never be able to accomplish. Nothing yields larger returns than a good paying mine. Under this plan, all stand on an equal basis, and if you become a shareholder, you become a partner in proportion to your investment. This insures an equal chance to the smallest investor, and absolute fairness.

In its "Preamble," the Company says: "It has been proven by those who have made the most money out of mines that the best way is to take hold of a claim in a good locality which looks as if it had some future to it, prove its worth by labor, and then expend the necessary money for a plant. The few thousands spent in this way often return many hundred fold. There are great numbers of this class of mines in the mining regions of the country, and they may be readily and cheaply acquired.

"By creating a fund which yields a certain income every month, we can work mining properties in such an increasing number that we must obtain an average result. In this



CROPPING ON MOUNTAIN BEAUTY MINE.

sense, we have made the law of average the fundamental principal of our undertaking. To illustrate, there are 100 properties offered to the company. Our mining experts find that only 10 are first class and 90 as inferior. Out of the 10 recommended prospects, there may be one or two a success, and pay eventually \$1,000 a month. This certainly would pay amply for the expense of the other eight and make a sure gain, as by the careful selection, and accepting a number of the best, we have obtained the advantage of a favorable average, while, on the other hand, if 100 different owners individually would develop each one his prospect, and they were equally successful, 98 would be losers against only two winners, thus explaining the so often discouraging loss in mining, as the availability of average assured in our company was unobtainable by these individual workers.

The Battle Creek Steam Pump Co., of Battle Creek, Michigan, has issued their catalogue, No. 9, illustrating the Marsh Steam Pump, a standard for all duties. These pumps have absolute actuation and regulation, are fitted with patent self-governing steam valves, patent, easy-seating water valves, and have no outside valve gear. They are simple not duplex. As Emerson says, "to be simple is to be great." They have a maximum of strength and service, are economical, efficient and durable, and are adapted for every service.

This catalogue is well gotten up, having been printed on fine glazed book paper, with an elegant lithographed cover. The lists and detail tables have been arranged with care, and in convenient form.

The first section of the catalogue is devoted to standard boiler feed pumps. Section two embraces tank and vacuum pumps, while section three describes air compressors. Section number four calls attention to deep well pumping engines. The fifth section of the Utah catalogue shows pumps for handling the hot water of condensation. A description of pumps for sugar-house work comprises section six, and the Marsh sinking pump is described in the seventh section, while the eighth section contains illustrations of Marsh creamery pumps. Section nine speaks of Marsh hydraulic pumps and engines, and the last section, which is number ten, is a general resume of miscellaneous Marsh pumps.



TUNNEL ON MOUNTAIN BEAUTY MINE.

AMERICAN DEVELOPING AND MINING COMPANY.

The town of Gibbonsville is situated in Lemli county, Idaho, about four miles west of the summit of the Rocky Mountain Range and thirty-five miles in a northerly direction from Solomon City, the county seat, at an altitude of 4,500 feet above sea level.

Placer gold was first discovered near the site where Gibbonsville now stands in the early '70s by Montana prospectors enroute to the Loon Creek placer excitement, forty-five miles further west. Soon after, profitable mining was carried on by the Nicholson Brothers.

Afterwards, in August, 1877, quartz veins carrying gold were discovered on what is now known as Gibbonsville Hill, and later on, in the fall of the same year, the miners organized the Dablonega mining district, to cover all the area west of the summit of the Rocky Mountain range drained by the north fork of the Salmon river and its tributaries.

In the spring following (1878), on petition of the residents of the district a postoffice was established and named Gibbonsville, in honor of Gen. Gibbons, who commanded the United States troops against the Nez Perces Indians under chief Joseph in the celebrated battle of Big Hole, fought the previous year. From this time on a large number of men were occupied in mining the surface ores of the district. These were successfully treated in arrastras and small mills, but when the sulphide ores were encountered the primitive plants failed to treat the ore profitably.

In this condition the American Developing and Mining Company, a syndicate of Whitehall, Montana, men, found the camp in 1892, and purchased the principal group of mines there. Since that time the systematic development of these mines and their equipment with mining and milling plants have been conducted on an extensive scale with favorable results by this company. On Gibbonsville Hill the company owns thirty lode claims, from the surface ores of which \$450,000 had been extracted by the original owners, with the primitive methods above outlined. In the neighboring gulches and adjacent hillsides it also owned about 600 acres of placer claims and millsites.

For the development of its lode claims the company has adopted a system of adit cross-cut tunnels, three in number, 180 feet apart, vertically. These tunnels, with the drifts, raises and winzes run on the veins from

them, aggregate a total development of about 20,000 lineal feet.

Owing to the fact that the mines are developed and operated through adit tunnels and the compressed air used by the drills generated by water power, the mining plant while effective is comparatively small and cheaply maintained. As may be seen in the illustration it consists of a building 30x64 feet, containing an air compressor, machine shop, store room and also a building 26x40 feet for blacksmith shop, with lean-to for charcoal bins, situated at the mouth of No. 3 or deep tunnel. A special ore bin of 400 tons capacity receives the ore as delivered from the mines.

The buildings comprising the reduction plant are shown in the illustration, and the mill has ample capacity for the treatment of 100 tons of crude ore and twenty tons of concentrates daily, using a combination of processes which may be described in three sections as follows:

First: Stamp crushing and amalgamation of the free gold and copper plates, followed by concentration of sulphurets from the pulp on Frue Vanners.

Second: A Pearce turret furnace with roasting oven annexed for

mine and mill work; it is equipped with the best of modern appliances for the analyses of ores, and contains drying, melting and assay furnaces, and charcoal chute conveniently arranged. A telephone line connecting mine, mill main office and town affords the usual facilities for inter-communication.

The stamp mill and equipment was first erected and operated in September of 1895, and for four months after starting it was in successful operation, during which time it had produced over \$40,000 in free gold and over 900 tons of concentrates valued at \$60 per ton. The value is mostly gold, only one per cent being silver.

The property has had a varied existence from the first, and while it is an excellent property today it has had the misfortune of passing into the hands of a receiver.

The following report was turned into the United States court at Butte, Montana, by the receiver, F. W. Bacorm for the month of November:

"There was produced of what is known as plate bullion, \$8,624.65, and 78,000 tons of concentrates, which, after deducting loss in cost of treatment, it is estimated, will have a net value of \$2,447.60, making a total product for the month of \$11,072.25. The expenses were as follows: Pay roll, \$3,840.40; supplies consumed, \$940.50; ore purchased, \$7,403.65; total expenses, \$11,924.55, the costs exceeding the earnings by \$852.30.

"At the Gibbonsville store the sales amounted to \$3,337.02. In addition to this goods to the amount of \$635.66 were used by me in the operation of the mine and mill, and are included in the item supplies consumed, \$940.50 above."

The document also includes a balance sheet showing that the receiver had \$1,814.27 in cash on deposit and otherwise, that \$6,302.79 has been paid to former employees of the company in accordance with the order of the court; that \$3,337.48 has been paid for legal expenses, office expenses and allowance paid receiver under order of the court; that \$2,993.50 has been paid for maintenance of the property in the receiver's hands, under orders of the court; that \$2,400 has been paid in settlement of certain damage cases against the American Development & Mining company under orders of the court; that \$10,000 has been borrowed from the Union Bank & Trust Co., of Helena upon receiver's certificate No. 1.

The Sioux Corlies engine, at the Omaha Exposition, was awarded the gold medal over its competitors. This engine was built by the Murray Iron Works Co., of Burlington, Iowa, and it was in continuous operation, twenty-four hours per day, during the greater part of the Exposition, furnishing all of the power used on the grounds.



AMERICAN DEVELOPING AND MINING COMPANY'S MINE.



AMERICAN DEVELOPING AND MINING COMPANY'S MILL.

the process of dead-roasting of the concentrates.

Third: Chlorination of the roasted sulphurettes in the revolving barrels and precipitation of the metallic gold from the chlorine solution.

The first action of the plant is the ordinary gold 30-stamp mill especially arranged for the crushing amalgamation and concentration of auriferous pyritic ores, fitted with the most approved automatic and economical devices.

The whole plant as above described is driven by water power and lighted by electricity. The water power is supplemented by a steam plant of sixty-horse power to be used for auxiliary power and steam heating purposes when occasion demands.

An assay office is conveniently situated for

A FIFTY HORSE POWER GASOLINE HOIST.

One of the largest gasoline double drum hoists ever built, is the one built for the Minas de Santa Maria de La Paz, Matehuala, Mexico.

The gross measurements are: 17 ft. 6 in. long by 9 ft. 6 in. wide and the drums are so arranged that they may be operated independently of each other, and are controlled by a set of four levers, the two for operating the lead screws and the two operating the brake bands as well as a lever for actuating the governor, are all mounted on a suitable platform, so as to enable the operator to maintain full control of the entire hoist without moving from his position. It is also fitted for both tube and electric igniter and weighs 25,000 lbs.

The hoist has operating cages in a double compartment shaft and the duty on each drum consists of lifting 15 metric tons 400 meters per hour, making 22.2 H. P. of 75 kilogram-meter on each drum.

One of the important features of this hoist is, that the operator may reduce the speed of the engine between loads if necessary.

While in the testing room before shipment, this engine running at 100 revolutions per minute used the exceedingly small amount of 6 gallons, 74 degree gasoline in 10 hours continuous running in another test it developed 48 Brake H. P. continuously for 10 hours on a consumption of 48 gallons of gasoline, and a third test developing 24.3 H. P. it consumed 29 gallons of gasoline, on a 10 hour continuous run.

It will be seen from the above

tests that the consumption of fuel in a gasoline hoisting engine is in exact proportion to the number of foot pounds lifted in a given time, basing the calculation on 1-10 of a gallon of gasoline to each H. P. exerted per hour.

Using the tank system for water circulation around the water jacket and valve chambers is also an important factor in present location of this engine where water is a very scarce and expensive article as the evaporation during a day and night on a continuous 40 H. P. load was only 22 gallons. This hoist was built by the Weber Gas & Gasoline Engine Co., 434 S. W. Boulevard, Kansas City, Mo.

Graphite.*

One of the most important materials of commerce and of the arts is graphite. Its origin, its nature, its formations, its sources of supply and its many uses, would make a most interesting publication while its possible importance and its uses in the future are only beginning to be grasped by enthusiasts of today.

Graphite is one of the many forms of carbon; it is a triplet brother of diamond and

charcoal; it is closely related to the coal family and in combination it is related to all organic matter indeed, the chemical study of organic bodies is now termed "the chemistry of carbon compounds."

Diamond and graphite are crystallized forms of carbon, while all, or almost all other forms are amorphous. Therefore, while graphite, plumbago and blacklead are practically one and the same thing, the term blacklead is commercially applied to the graphite which comes from Germany, Bulgaria, Mexico, and many other places.

The "transmutation" of metal is probably far distant in the future, but diamond and graphite are being regarded as being "interchangeable from a molecular point of view." That is to say, they are regarded as consisting of the same substance, under different conditions of molecular arrangement. The diamond can be changed into graphite, graphite can be changed into diamond—but not at a profit in either case.

Properties.—Graphite or carbon in any form is insoluble, not fusible or volatile, but combustible, forming carbon monoxide, or the dioxide usually. Graphite is an excellent conductor of heat and electricity; it has a

glazing his powder to prevent the absorption of dampness, and the shot manufacturer to to polish his shot and make it so smooth and slippery that the charges will not be crowded.

The organ and piano manufacturer uses graphite for lubricating piano action and organ slides; the housewife uses stove polish, and every one of us uses graphite in the form of lead pencils. In fact, it can be said in all truth that graphite is more or less used by every industry and by everyone throughout the civilized world, and that it is quite as indispensable to the requirements of the world as iron itself.

Caution.—Graphite, as it comes from the mine, contains from 50 to 60 per cent. silica, sulphur and other impurities, and the process of completely freeing the graphite from impurities requires very expensive machinery and the most skillful manipulation. Only manufacturers having such facilities can hope to produce an absolutely pure article. The impurities in much of the graphite now in the market take on the appearance of graphite by contact, and such impurities are sometimes undetected even by the expert, unless chemical tests are employed. This is especially true of amorphous graphite, commonly called black-lead, which is graphite without any particular form and usually mixed with clay.

Graphite is the name of a new publication of which we are in possession of Vol. 1, No. 1. It is issued in the interest of Dixon's Graphite productions and for the purpose of establishing better understanding in regard to the different forms of Graphite and their respective uses.

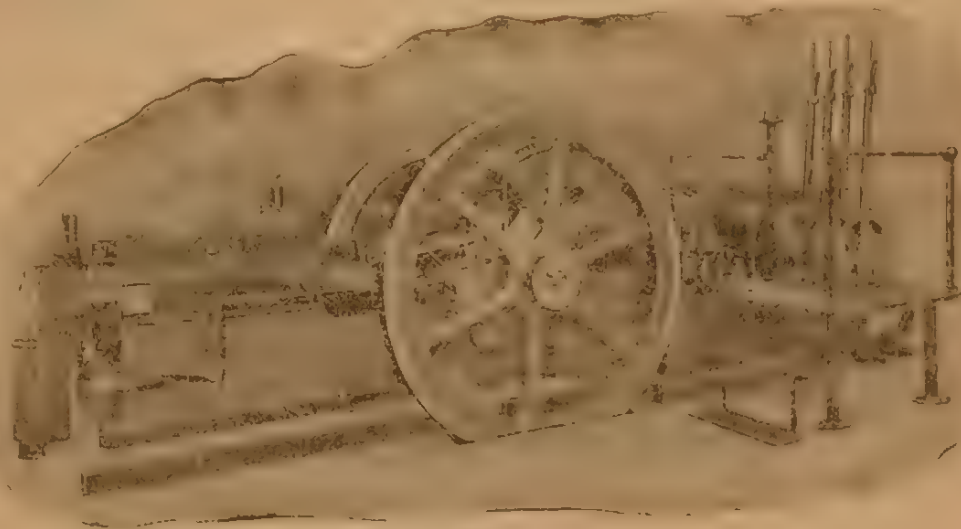
It is copyrighted by the Joseph Dixon Crucible Co. of Jersey City, N. J.,

has four pages, and is full of interesting reading about the all useful graphite.

The Connersville Blower Co. of Connersville, Ind., have issued their 3rd catalogue of Pressure blowers, Rotary pumps; Gas exhausters and Hydraulic Motors for 1898. The catalogue is handsomely gotten up covered with a heavy dark green paper cover embossed in gold. The body of the pamphlet is printed on heavy glazed paper and shows numerous beautiful halftone and line illustrations. On the whole it is an excellent type of the modern catalogues and contains no other advertisements than their own.

Mining Location Notices.

Mining Location Notices are required by law to contain certain distinct statements. A notice which fails to contain them may cause serious trouble, and may possibly invalidate your title to valuable property. By using notices prepared, so that the locator cannot fail to state everything required by law, trouble from that source is avoided. Bell's California Mining Location Notices will be found correct in this particular.



FIFTY HORSE POWER GASOLINE HOIST.

smoothness and lubricating power not known in any other solid substance. These properties make it invaluable for the many present uses and it is these properties that will carry its usefulness beyond our greatest expectations.

Uses.—As a lubricant, whether in dry form or mixed with oils or greases of any kind, it is recognized by both scientific and practical men as absolutely without an equal.

While its qualities as a paint have long been recognized by many careful investigators, it is only during 1898 that it has been most conclusively demonstrated to the world generally to be pre-eminently the best preservative coating for exposed metal surfaces.

Graphite crucibles for melting brass and all other metals, and graphite stoppers, skimmers, ladles, and other heat-resisting devices are known to every foundry-man and worker in metals as are also graphite or black-lead facings and washes for molds and cores.

The electrolyser depends upon graphite for perfect electrotypes; the electrician uses graphite for resistance purposes in making up his rheostats and his lightning arresters and for commutator dressing as well as for many other purposes.

The powder manufacturer uses graphite for

* From Jos. Dixon Crucible Co.'s December number of Graphite.

Miscellaneous Mining News.

ALASKA.

Berners bay is keeping up its reputation, the Ophir, Northern Belle, Bald Eagle and Seward all having their mills in operation. Judge Mellen, who represents an Indiana company, and who successfully opened up the Jualin, is now developing the Ivanhoe, over the ridge between the Jualin and the Comet, and has about completed a 20-stamp mill. The Jualin has turned out \$10,000 or \$12,000 a month since it started. Milo Kelly has some very good claims in the Berners bay district, showing free milling ore, and is working them. Montana creek, which runs into Linn canal between Berners bay and Juneau, is coming to the front. The placers were worked in the early days, and now the Early is working in very rich ore and running a five stamp mill. The Boston and Alaska Company is sinking a shaft on the Hunters bay mine.

ARIZONA.

F. B. Logan has the following to say of the Globe mines in the Tucson *Citizen*:

The Globe mines were first located and worked for silver only, but long since have developed into very rich copper producers. There were but five people in Globe when Dr. T. C. Stallo came in 1876, bringing with ox teams the first merchandise ever sold in Globe.

The Stonewall Jackson silver mine, near the site of Globe, owned by one Harris in those early times, became famous as the producer of a 1500 pound silver nugget.

Globe will now, more than ever, be a desirable place of residence, since it has ready communication by rail with the outside world.

A brief glance at the Old Dominion Copper Company's plant and operations may be of interest. The superintendent, Mr. Parnell, being absent, I was unable to secure but meager data of the workings. At the mine, from personal observation, I learned that the company was making numerous and important improvements and additions to their already extensive machinery. The whole hillside was strewn with lumber and casting material for various uses about the new machinery to be added. In the new machine and carpenter shop, a 22 inch drill press, a 6 foot planer, a new pipe cutting machine, with power to cut pipe from 2½ to 8 inches, and other improvements were noticed. * * *

E. H. Cook is the superintendent of the United Globe Mines, formerly known as the Buffalo Copper M. Co. Mr. Cook was also absent at the time of my visit, but through the courtesy of A. L. Waters, the metallurgist and smelter, I learned something of the present and prospective movements of this company.

The smelting ore now comes from the Black Warrior mine, but the company is developing the Hoosier group and the mines lying on the Globe ledge formerly worked by the Old Dominion Co., and developing four others on a parallel ledge. The improvements under headway and in contemplation are quite as extensive as those of the O. D. Co. above described. An electric motor will remove the slag from the three large furnaces, while the 3000 foot tramway, some time in use, delivers the ore from the mine to the smelters. A new

dynamo will soon be ready to furnish electric light all around the works. * * *

The Lost Gulch Gold Mining Co. and mines of the Webster gulch are spoken of with high confidence, as is also the Pinto mining district 18 miles west of Globe. The latter is a comparatively new district, but nevertheless considerable development work in it has been accomplished by Messrs. McNelly, Williamson, Siebert and Crowley, who own herein a group of six claims, running high in copper. A tunnel of 190 feet develops good copper ore and another tunnel of 180 feet cuts through a 38 foot ledge, and at the end of the tunnel a 36 foot gold ledge has been struck running from \$3 to \$5 in gold. A 28 foot ledge of copper on the Hal and Al claim running from 10 to 12 per cent. A 130 foot tunnel on the Dan and Mac mine has been run. A 60 foot extension, it is estimated, will reach the main copper lead. The mineral belt extends miles beyond and prospects well.

W. House and others have gold claims a few miles from Globe, with considerable development work exposing an 8 foot ledge of good ore, principally gold.

CALIFORNIA.

AMADOR COUNTY.

The Mechanics mine people, of Sutter Creek, are having a crushing of ore hauled to the Bullion mill. This ore is rich and yields plentifully in free gold as well as sulphurets.

Nothing is being done at the Centennial mine, at Drytown, except keeping the water out of the shaft. A good supply of material is already on hand, and we hope to see this property working in full blast again within the next few weeks.

An attachment on the Amelia mine, near Jackson, which was placed on it about the 1st of the month, has been released by bonds. The work on the property will now be pushed forward with the least possible delay and greatest economy.

Everything about the Pocahontas mill, Drytown, is getting into shape, and will be ready to run as soon as the water comes. A force of men, under the supervision of Charles Mitchell, of Sutter Creek, is laying the pipe and cleaning out the ditch from the Amador Canal Company's ditch, past the Bunker Hill and Gover mines. Everything about the mine is in perfect running order, and looks promising for the Pocahontas to become one of the paying properties in the near future.—*Amador Ledger*.

CALAVERAS COUNTY.

The McSorley mine, of Chili Gulch, is producing crystals which are shipped to New York and have proven valuable. Mr. Burton, under whose management operations were conducted, intends to resume his hunt for more, and operations to that effect will be commenced in the near future.

EL DORADO COUNTY.

G. Thomas & Co., are preparing to erect a five-stamp mill on their quartz proposition, three miles below Gold Hill. The mill site has been selected, and the necessary surveys run out by Henry Lahiff. Mr. Roberts, the superintendent, is now busy driving the tunnel to tap the ledge, which, when completed, will give him 100 feet of backs.

After having been closed down for several years, the entire plant at the Gopher-Bowl

der, including the finely equipped electric plant on Rock Creek was started up again. The resumption of operations at this mine means much for Kelsey and El Dorado county.

KERN COUNTY.

The new dry-crushing and cyanide plant at Mojave is amongst the most complete west of the Rocky Mountains. The company has added many new features in the way of labor-saving inventions and improvements until it is brought up to the highest efficiency. Every advantage, to the smallest detail, is utilized, and works in perfect harmony on economical principles, even to the utilizing the water to the second and third time. The ore, which is mined and hauled four miles away, keeps up to its minimum average, \$27 gold and \$2 silver per ton. A. J. Morse, the secretary and superintendent, is a practical man and works on that basis.

A new free-milling Huntington plant, just completed and put into operation in close proximity to the cyanide works at Mojave, is having all it can do. It is owned by a Mojave company of local capitalists and business men.

The whole country around Mojave is attracting attention, and a new mining era is dawning with more than average stability.

Work on the new mill, of the Yellow Aster Company, was temporarily delayed on account of the non-arrival of the mortar blocks. These are twelve pieces of Oregon pine, 30x30 inches square and twelve feet long. There are six batteries and two of these blocks are to be used for each battery. The frames of the mill, engine room, ore bins and all, are in place and only await the corrugated iron with which the roof and the outsides are to be covered. The machinery is about all on the ground and the boilers are now being set up. The three iron water tanks are completed and the water connections made. The new forcing pump, to force the water through the pipes, is in place at the wells. The 30,000 gallon oil tank above the mill is completed, and if the blocks arrive in time, the mill will be running by the fifteenth of January as at first announced. The mines are looking better as development work progresses, and the last clean-up at Barstow for the month of November amounted to about \$47,000.

The Hard Cash.

The new mill at the Hard Cash is about completed and was started last week. Everything worked very nicely and the company feel confident. Much money has been expended by the owners of the Hard Cash in the erection of buildings which are of an excellent character, the engine room, mill house and concentrator house, being all separate and yet under one roof. They are all put up substantially and covered with shingles. A fine chute is built to connect with mine above and covered with corrugated iron, and everything is very complete and convenient.

The ore when hoisted from the mine is dumped into the chute and lands at the hopper at the mill. The mine is a tremendous body of ore easily worked, requiring no waste hoisting, as the vein is larger than the double compartment shaft which is down about 100 feet, where a drift is run to the south 100 feet more, showing no indications of running out.

It will require some days to have the mill running in complete shape, but it is expected

that by the first of next week everything will be in shipshape and the company beginning to reap some reward for their expenditure.—*Randsburg Miner.*

MARIPOSA COUNTY.

There was filed in the United States Circuit Court, December 8th, an important mining suit, involving property worth over \$3,000,000. The disputed lands are located in Tuolumne and Mariposa Counties. The Merced Gold Mining Company, a Montana corporation, is the complainant. The accredited respondents are David Dorward, C. M. Dabney and Daniel Corcoran of Coulterville, Mariposa County, and they appear as the representatives of the Rosenfelds and other San Francisco capitalists.

TUOLUMNE COUNTY.

The famous Black Oak mill is soon to have its crushing capacity increased one-third, by ten additional stamps. It is generally understood that grading and other preliminary work will be in action in a few days, and that it will be done in such a way that if, later on, they desire again to add ten stamps more, it can easily be carried out. We hope and expect that we may, ere many months, record in our columns that the Black Oak is adding the ten stamps that will make it a forty stamper.

COLORADO.

Cripple Creek Production.

The managers of the various treatment plants handling Cripple Creek ores report as follows:

Gillett Reduction Works treated 2,600 tons, averaging \$26. A gross value of \$67,600.

Colorado Ore Reduction Company, Arequa gulch, 2,400 tons, average \$28. Total \$67,200.

Brodie Mill, Mound City, 1,850 tons, average \$22. Total value \$40,700. The above figures are estimated on the month's output, no figures being obtainable in the absence of managers.

Metallic Extraction Company, Florence, 9,500 tons, average \$30. Total \$190,000.

El Paso Reduction Company, Florence, 3,100 tons, average \$25. Total \$77,500.

Colorado-Philadelphia, Colorado City, 7,000 tons, average \$30. Total \$210,000.

The small treatment plants, tonnage unknown.

Smelting ores, 10,700 tons, with an average value of \$73.50. Gross bullion value, \$786,450.

Summarized the totals stand:

Plants.	Tons.	Value.
District mills (3).....	6,850	\$ 175,500
Florence (2).....	12,600	267,500
Colorado City (1)	7,000	210,000
Small plants.....		17,500
Smelters.....	10,700	786,450
Grand totals.....	37,150	\$1,456,950

The New York Tunnel and Mining Company is a corporation that is not heard very much about, but for all that, it is a substantial one and one which believes in doing lots of work.

The company owns a tunnel site at the head of Squaw gulch, and during the past few years it has pushed the bore into the hill a distance of 1,200 feet and over. Numerous

veins have been cut in the process, but very little prospecting on them has been done, the management being anxious to push ahead. A vein is now, however, being drifted upon, and the outlook is said to be encouraging.

The New York Tunnel Company stockholders have just held their annual meeting. There was a very good representation of stock, and at this, and the subsequent directors' meeting the following officers and directors were elected: J. J. McCarty, president; John Bridge, vice president; J. W. Campbell, secretary and treasurer; J. C. McKenna, superintendent; and R. T. Fahey.

The treasurer's report showed that over \$4,000 had been expended in pushing the tunnel ahead during the past twelve months, and that considerable development work had been done. The company has money in the treasury and is in a prosperous condition. It has secured leases on some of the most desirable properties under which its tunnel passes and where the showing is said to be very good. The work of the past month is said to be the most encouraging in the history of the company, and from the present showing it would not be unreasonable to expect a new producer to be opened up any day.—*Colorado Springs Mining Investor.*

GEORGIA.

Our correspondent at Dahlonega writes: The mining excitement here continues unabated; many new people are coming in to examine the mines and many of them invest. If this section was 100 miles north of Klondyke, in an inaccessible place, it would require a standing army to keep the people away from here, from the reports that could honestly and fairly be made.

IDAHO.

The Florence *Miner* reports rich strikes in the Good Enough, Iola and Little Giant mines, near Warren. The Good Enough has a solid body of \$40 ore six feet wide, in the stope about 35 feet above the lowest workings. The Good Enough mill has been running about five weeks and a very satisfactory clean-up was made in the first month's run.

The Iola ledge is increasing in size and richness with depth, there being five feet of ore in the lower workings that will average \$60 per ton. Picked specimens have assayed as high as \$22,000. Thirty-five men are employed at present on this mine and the mill is running night and day.

The Little Giant mine is developed to a depth of 300 feet and has a pay shoot that runs from \$200 to \$20,000 per ton, the free gold being visible all through the ore. This mine does not employ a very large force of miners and the output is not large, all owing to a fanciful idea of the owner, which is not in the interest of a greater amount of production.

Hiyu Has Resumed.

The Hiyu mine, near Florence, has resumed operations and is at present working a force of about fifteen men. A. D. Wheeler, an expert mill man from Greenwood, B. C., has the management of the property, and is at present putting the mill in repair. The mill will start up in a few days and run through what ore is in the bins.

The work of sinking the shaft 200 feet deeper will commence in a few days. A new pump and piping has been purchased and is now on the ground.

MINNESOTA.

The amount of ore shipped over the Duluth, Misabe & Northern road and the Duluth & Iron Range, will be found in the following table published by the Duluth *News Tribune*:

Following is a comparative statement of the shipments from the mines on the Misabe road for 1897 and 1898:

	1898.	1897.
Franklin.....	200,273	30,128
Adams.....	390,770	175,800
Commodore.....	77,046	60,797
Lone Jack & M. Mt.....	385,792	601,072
Mountain Iron.....	650,021	773,538
Rust.....	38,385	.....
Burt.....	15,274	.....
Hull.....	75,851	.....
Pillsbury.....	79,691	.....
Ohio.....	65,579	.....
Sellers.....	112,763	.....
Biwabik.....	383,179	.....
Duluth.....	112,155	.....
*Lake Superior group .....	.....	259,910
Day.....	18,725	.....
	2,626,384	2,328,720

*The mines in the Lake Superior group are given separately for 1898.

Following is a statement of the shipments from individual mines on the Iron Range road:

	1898.	1897.
Minnesota.....	427,764	592,196
Chandler.....	715,857	438,366
Pioneer.....	123,183	207,103
Auburn.....	235,631	175,263
Norman.....	110,141	101,070
Fayal.....	575,933	642,939
Genoa.....	279,677	309,514
Sparta.....	226,154	66,720
Elba.....	564	.....
Sample Car.....	25	.....
Cincinnati.....	.....	32,720
Roberts.....	.....	18,614
Zenith.....	.....	40,817
Hale.....	.....	13,728
Cloquet.....	.....	12,215
Totals.....	2,693,929	2,651,265

MICHIGAN.

Calumet Dividend.

The Calumet & Hecla Copper Mining Company has declared a dividend, \$10, making \$50 for the present year, and \$55,850,000 in all. A very pretty showing.

Shipment Stopped.

Shipments of ore from Ishpeming mines have ceased, the Lake Superior being the last to stop. A cargo was needed for the Illinois Steel Company which required attention. Stock piles are well cleaned up, and prospects for the coming year are excellent.

Franklin Stamp Mill Burns.

The stamp mill at the old Franklin copper mine was destroyed by fire last week. It had been in constant operation for 38 years. There were three heads of stamps under which 14-ton anvil blocks had been placed during the past few years, which added to their former efficiency. The capacity was about 450 tons of rock in 24 hours.

This removes the last stamp mill from Portage Lake in the vicinity of Hancock and Houghton. The old mill was an expensive

one to operate, in that it had been impossible to arrange things in modern fashion. Many additions had been made to the original building, the ground under roof being considerable at the time of the fire.—*Iron Ore.*

MISSOURI.

Joplin Notes.

The Topsy mine at Lehigh has put in a 9-inch pump and is working and making good turns.

The Sergeant shaft on the Snapp-Warren at Tuckahoe has struck a deep run of jack at 200 feet; they have a face of 20 feet.

J. L. Naulty has purchased eleven acres of the A. Mitchell land, adjoining the East Alba mines, and will prospect it for mineral.

Houk & Co., on the Chitwood Hollow Mining Land Co.'s tract have let the contract for a complete concentrating mill, to cost \$4,600.

In sinking the shaft, the Morning Star mine at Oronogo has encountered what is considered the richest run of jack in that camp.

The Old Hickory in Chitwood Hollow is running a prospect drift at 130 feet, and is opening up a good run of lead at 20 feet from the shaft.

In addition to the crusher and rolls put in at the Mascot on the Bailey lease, the owners, Geo. Redell and Chris Steinbach are figuring on putting in Star jigs.—*Joplin Herald.*

MONTANA.

H. L. Frank, who recently acquired a large interest in the famous Hope mine, of Basin, Jefferson County, has returned, after making a personal investigation of conditions at that property. He declared that he was more than surprised at the showing on the bottom level, and predicted that the Hope would yet be known as one of the great gold mines of Montana. Mr Frank has been interested in mining for many years, and his judgment is generally accepted by mining men in mining matters. It yielded about three-quarters of a million dollars from the surface to the 300-foot level, and it is generally believed that nearly 50 per cent of the output was lost in the tailings and went into the creek, owing to the crude and imperfect method of concentrating.

"Up near the 200-foot level the ledge was only about six feet wide. Down at the 500-foot level, where the station is now being cut, the ledge is 24 feet wide, and the prettiest quartz ever seen in any state. In fact, it looks like a mountain of quartz and it carries good values too. If it only carried a value of \$5 to the ton in gold, it would be one of the biggest mines in the state, but an average assay will give better results than that. Six feet of this ledge is solid ore. It looks exactly like the narrow streak of high grade taken out above the 200, which netted the fortunate owners over \$600,000. There is about 1,000 feet of development work at the 300-foot level and about 800 feet at the 200, where they took out the rich ore a few years ago. There is yet fully 10 feet of ore in the hanging wall, as indicated by crosscuts made at different points.

"We are now cutting a station and putting in a pump at the 500. We will drift on the ore body to the Katy line, which will probably be about 30 days' work, and will then begin sinking to the 600. If the ore body at that depth is half as good looking as it is at

the 500, the company will begin work on a 500-ton concentrator, which we believe we will have in operation by July."

Work is being actively pushed on the Katy mill, at Basin, the frame work being nearly all in place. The large smelter across the river is nearing completion and when it is finished electricity will be used as the motive power and also for lighting the lower workings of the mine. There is some talk of the city being lighted from the plant. The stockholders of this property have recently increased the capital stock from \$600,000 to \$1,000,000.—*Helena Independent.*

NEVADA.

The Deep Mining Project.

Matters connected with the pumping of water from the Comstock mines is now assuming definite shape. The tank on the side of Mount Davidson, from which the water will be procured to work the pump, is now up and will be ready to receive the water in a few days. The repairs to the pipe leading to the C. C. shaft are almost completed, and the Virginia and Gold Hill Water Company is repairing the ice house at the five-mile reservoir, where they will store ice this winter with which to supply the mines next summer. To add to the general activity in connection with deep mining, miners have been put to work to repair the C. C. shaft.

The stockholders of the Holmes Mining Company, of Candelaria, Esmeralda County, Nev., by a unanimous vote of more than two-thirds of the capital stock, have authorized the directors to create a bonded indebtedness of \$175,000, with which to pay the existing indebtedness of the company and provide funds for resuming work in the mine. English capitalists have agreed to take the bonds.

NEW MEXICO.

Output of Hillsboro Mines.

Output of Hillsboro gold mines for the week ending Thursday, Dec. 8, 1898, as reported for *The Advocate*:—

	TONS.
Wicks.....	40
K K.....	35
Richmond.....	65
Snake Group.....	85
Opportunity.....	35
Sherman.....	10
Cincinnati.....	30
Trippe.....	90
Rex (silver-lead).....	16
Eureka.....	10
Freiburg.....	15
Total.....	431

Total output since January 1, 1898—9,581.

OREGON.

The huge dredger of the Griffith & McDewitt Construction Co., of Chicago, has begun work on the gravel beds of John Day River, in Grant County. The machinery handles 2000 yards of dirt every 24 hours. Two shifts of five men each are employed and the dredge is operated day and night. A 50-light capacity dynamo has been placed on the boat and it presents a pleasing spectacle at

night. The company has several dredgers under construction, one in Montana, another in Utah.—*Oregon Mining Journal.*

One of the most important events in mining in the Cracker Creek district that has occurred for some time was the strike made a few days ago in the E. & E. mines.

From a reliable source it is learned that on the 300-foot level of the Excelsior in the north drift, a vein of one and one half feet of ore gives returns by assay of \$312 to the ton. The full width of the ledge in the drift is seven feet.

In the Excelsior No. 2 tunnel, also, a five foot ledge has been uncovered in a drift that assays \$30 to the ton.

SOUTH DAKOTA.

Rapid City Chlorination Works.

The Rapid City, South Dakota, Chlorination Works started up last week for a trial run on ore from the properties of M. H. Day. Since the plant has passed into the hands of Mr. Day many alterations and improvements have been made in it, and it is now one of the best appointed institutions of the country.

Black Hills Notes.

Quartzite is said to have been struck in the Chicago & Two-Bit shaft, in Two-Bit, at a depth of 500 feet.

The steel hoist over the Deadwood-Terra shaft is nearly enclosed. It will be completed about the first of the year.

A good body of ore is said to have been discovered, on ground owned by L. P. Jenkins, H. T. Bigler and associates, of Lead, in Strawberry.

John L. Scofield has put a force of men at work on the Aurora group of claims, in Ice Box Canyon. The property is owned by Deadwood parties.

The Faust & May shaft, at Garden City, has been emptied of water, and everything is in readiness to commence sinking. A new pump was put in this week.

General John Walker has purchased the quarter interest in the Morrow lease on the Dakota Maid property, which was owned by Messrs. Secoy & Shaw. The purchasing price was \$2,000.

UTAH.

W. S. McCornick, the Salt Lake City banker, has secured a third interest in the well-known Ajax mines of Mammoth, having bought Samuel McIntyre's interest.

It is reported that Bullion Beck Company's mines at Eureka are again in good ore on the 1400 foot level. The regular dividend of 10c. per share, of \$10,000, was paid on the 15th of December.

The gold, silver, copper and lead property of Eureka also paid a dividend on the 15th of December, amounting to \$15,000. The last dividend was paid in March, 1897. The mine is said to be in excellent condition—a new ore chute having been opened up, and this may prove to be the equal of any found in the palmy days of this bonanza.

The Buckeye Company of Tintic announces the resumption of ore shipments from their well known properties.

Work is being pushed steadily at the Alliance mine near Park City, but there is no

change in the character of the ore. Good reports reach Salt Lake City from the Anchor property, also at Park City, in the form of an increase in the ore values.

Matters look much brighter at the Chloride Point mine, near Mercur, in the Camp Floyd district. The mill tonnage is being increased and the savings are high.

Developments at the Galena mine, in the Fish Springs country, are being rapidly pushed ahead, and the mine is in a better condition at the present time than for a year past.

Reports continue to come in of a strike of rich ore at the Mammoth property, located near Mammoth, Utah.

WASHINGTON.

Patrick Clark, of Rossland, says: "Republic is a new camp. It differs from the Rossland camp in a good many ways. This is true as to the character of its ores and the formation. There the ore is of the cyaniding variety and carries no copper or other base metal. The values are principally silver and gold, mostly the latter. The cost of reduction in both camps is about the same, but when we have a railway it will be cheaper. The ore in Republic is not of much higher grade than is found in Rossland mines. There is this difference, however, that at Republic the ore can be treated on the ground, which is some little advantage. The greatest drawback that we have in the way of more economical extraction of the ore of Republic is transportation facilities. Rossland is well supplied now with transportation facilities, which was not the case when I first came here. We expect that we will have railway transportation at Republic next year. I think we will have a city at Republic about the same size as Rossland. For its age, Republic has done well to have one good dividend payer in 18 months. There will be others in my opinion that will be dividend payers inside of a year. None so far, however, have as high grade as the Republic.—*Spokane Miner and Electrician.*

FOREIGN MINING NEWS

BRITISH COLUMBIA.

GOLDEN.

At the annual meeting of the Northeast Kootenay Miners' Association, held at Golden last week, the following officers were elected: President, Hon. F. W. Aylmer; vice-presidents, Golden mining division, W. G. Mitchell-Innes; Windermere mining division, J. L. Mackay; Donald mining division, W. G. Neilson; secretary-treasurer, E. A. Haggen; committee, Messrs. M. Dainard, H. G. Low, W. McNeish, C. Cartwright and H. G. Parsons.—*British Columbia Mining Critic.*

FORT STUKLE.

New machinery has been placed on the mines of the Sullivan Group Mining Company. There has been opened up a vein 100 feet wide between walls showing 65 feet of clean galena. In a crosscut on this ore body an average assay of \$70 in silver and lead was obtained. In a test pit sunk on the Coye at a point about 100 feet north of the shaft, galena of much higher grade has been found.

ROSSLAND.

Superintendent Jack Hanley says that be-

fore spring he will develop the Bonanza mine into as valuable a property as the Le Roi. Besides the immense ore bodies already opened up, the miners are just penetrating in the 500 foot level a larger and richer ore chute than ever, and from now will ship three carloads a day. It is Mr. Hanley's intention to continue sinking until the 1000 foot level is reached, and hopes to have this depth by next spring.

MEXICO.

The famous old Santa Eulalia mine, near Chihuahua, which had its shaft burned out some months ago, has been thoroughly repaired and refitted, and the mine is now turning out large quantities of high-grade ore, as it did 300 years ago.

Enrique C. Creel and his Chihuahua associates have sunk a shaft 120 feet deep, at their La Alianza property, five miles from Chihuahua. This is regarded at Chihuahua as one of the most valuable mines in the state. It is located on ground that has been gone over for hundreds of years, and no one dreamed of denouncing it until recently.

F. M. Aizpuru, a large manufacturer of iron at Jalisco, Mexico, says *Modern Mexico*, also owner of very valuable iron mines, known as the Providencia, reports that some \$50,000 will be expended on new machinery for his plant. The work of remodeling will be in charge of Capt. A. Evans, Jr., of Pittsburg. At present, the mills turn out all kinds of iron, except rails and beams, but the mines in connection produce Bessemer ore, and steel manufacture is to be introduced.

The water has been pumped out of the Ahogado mine, near Hermosillo, Sonora, and the owners have started to sink the shaft to a greater depth and open up new workings below. This promising property is owned by a company of which James McNab of San Francisco is president, George J. Wanless of Hermosillo is general manager, and J. D. McGilvray superintendent.

Prof. E. T. Dumble, the geologist, who has returned to Sonora to explore and test the Barranca coal field in the interest of the Southern Pacific Company, has gone to the scene of his labors, reaching La Barranca early in the present week. The exploration force numbers two engineers and more than fifty workmen of various kinds, with a splendid outfit of tools and implements for the work in hand. It is anticipated that about fifty laborers will be employed several months in sinking shafts, running tunnels, etc.—*Nogales Oasis.*

GENERAL NEWS.

Horace F. Brown, M. E., patentee of Brown's Complete Automatic Mill Process, Brown's Horseshoe Roasting Furnace, Brown's Chloridizing Furnace, Brown's Cooling and Conveying Hearth, and Brown's Pulp Distributor for Leaching, is now located at Victor, Colorado. He is putting in a very large plant there, nearly 600 tons daily capacity, for the Economic Gold Extraction Co., and Mr. Brown believes it will bear out the name and says he will have an automatic milling plant that will be more economical than any other in the country.

STEAM BOILER HEATING SURFACE.*

(BY CHARLES WHITING DAKER.)

*Paper presented at the Niagara Falls meeting (June, 1908), of the American Society of Mechanical Engineers.

(Concluded from our issue of Dec. 15.)

It is very easy to understand why water should have so much greater heat-absorbing power than air. The specific heats of water and air are as 1 to 0.23 for equal weights; but since air at ordinary temperatures weighs only 1/812 as much as an equal volume of water, if we consider a thin film of air in contact with a hot surface and a film of water of equal thickness and area in contact with a similar hot surface, the water would absorb 3,530 times as much heat as the air if the temperature of each were raised an equal amount. Again, the relative heat conductivities of water and air, according to Lord Kelvin, are as 40 to 1. On the other hand, in the transmission of heat from a surface to a fluid, the mobility among the particles of the fluid, whereby fresh portions of it are constantly brought in contact with the surface, is a matter of great importance, and in this respect air, of course, has a considerable advantage.

The writer has been unable to find any trustworthy figures for the relative heat-absorbing power of air and water; and the practical importance of their accurate determination would be trifling, for we know in a general way and from the examples already cited that water absorbs heat very many times more rapidly than air, so many times that in the case of a thin plate, such as a boiler tube, transmitting heat from furnace gases on the one side to water on the other, we can be quite certain that the temperature of the metal plate is at most only a few degrees warmer than the water in contact with it.

In other words, in any steam boiler with clean heating surfaces we can assume the temperature of the fire side of the heating surface to be practically the same as that of the water in the boiler. Perhaps it may be 1 degree more; perhaps it may in some cases be 20 degrees, or possibly 30 degrees more. The difference is of no practical importance, since in the few cases where so large a difference as 20 degrees or 30 degrees may possibly exist, the temperature of the fire to which the surface is exposed is greater by probably 2,000 degrees or more than the temperature of the plate.

If, now, it is clear that the fire side of the boiler tube or flue is at practically the same temperature as that of the water in the boiler, the reader will have little difficulty in comprehending that this surface, and not the surface on the water side, is the real heating surface of the boiler, which measures its capacity of making steam.

The great resistance to the flow of heat in any steam boiler is in getting the heat from the hot gases into the surface exposed to them. Compared with this, the resistance to the passage through the plate and the resistance to the passage from the plate into the water are mere trifles. If we increase the surface exposed to the hot gases, we shall increase the capacity of the boiler to absorb heat; but if we leave the surface the same and increase the surface exposed to the water, the amount of heat transmitted in a given time will be practically the same.

The case can be made more clear perhaps by an analogy to the flow of water through the pipes. If we have a length of 1-inch pipe connected to two lengths of 12-inch pipe, and allow water to flow through them under a head, it is clear that the flow will be determined by the resistance of the 1-inch pipe

If we enlarge that, we shall enlarge the flow; but if we leave that alone and enlarge either or both the 12-inch pipes, the flow will be practically unchanged.

The area of the fire side of the tube is what determines the heat-absorbing power and the steam-making capacity of the boiler. If we can cause this to take up more heat in any way, we shall increase the power of the boiler. The *Serve* tube, with its ribs extending into the hot gases, increases the interior surface of the tube, and thus its capacity for absorbing heat. If, however, instead of putting ribs on the fire side of the tube, we put them on the water side, we increase the surface exposed to the water, but we make no increase of any practical importance in the amount of heat transmitted. In a similar way, the curved form of the tube, which causes the surface exposed to the water to be greater than that exposed to the fire (in fire-tube boilers), effects no increase in the amount of heat transmitted. The real heating surface, which determines the amount of heat transmitted, is the surface exposed to the fire.

In the preceding discussion it has been supposed that the heating surfaces were clean on both sides. As a matter of fact, heating surface is almost invariably more or less coated with soot or ash on the fire side and with scale on the water side. If the preceding discussion has been carefully followed, it will be clear that the transfer of heat will be much more interfered with by the deposits on the fire side than by deposits on the water side. To use again the analogy of the water pipes, a half-closed valve in the 1-inch pipe would have far more effect than a half-closed valve in the 12-inch pipe. It is no part of the purpose of this paper to excuse lack of care in keeping boilers free from scale; but it is nevertheless quite certain that a thin scale on boiler tubes does not interfere in any noticeable degree with the capacity or economy of a boiler, while the coating of the fire side of the tubes with a flocculent deposit of soot does certainly interfere in a marked degree with a boiler's steam-making capacity. Of course, a thick scale on the water side of the tubes or other heating surface, or any other material which acts as a non-conductor, may considerably obstruct the flow of heat. If it does this, the temperature of the heating surface itself will at once be raised, and may reach a point, as happens sometimes with the shells of externally fired boilers and with the furnaces of marine boilers, where the metal may be so heated as to bulge or buckle.

Another deduction of practical importance from the fact just set down, is that so far as the transmission of heat after the boiler is making steam is concerned, the circulation of the water in boilers is of a good deal less consequence than has been sometimes claimed. I do not mean by this that it is not worth while to make proper provision for circulation. There are possibly some parts of boilers worked with forced draft, such as the tube-plates of marine boilers, where it is so difficult for the steam bubbles to get away fast enough, that we have a mass of foam instead of water in contact with the plate. Under such conditions, of course, the plate is bound to be heated; but I know of no evidence that this is any other than a rare occurrence, even in boilers which are pushed most severely. If anyone is inclined to stick to the old hobby that circulation is of great importance to economy, I advise him to consider the conditions in the narrow water space (about $3\frac{1}{2}$ inches wide) around a locomotive fire box, where the steam rushing up is directly op-

posed by the water going down. Let it be understood that I am referring to circulation only as affecting the transfer of heat and the consequent economy and capacity of the boiler. Good circulation is desirable to prevent unequal heating of the boiler, and consequent straining, and it may be of service in preventing deposits of scale and mud in places where they are least desirable; but that it has any appreciable effect on economy and capacity is not proved, and probably cannot be.

It has been demonstrated above that the surface exposed to the fire is the real heating surface of a steam boiler. Is there any good reason why this should not be generally adopted by engineers as the correct, and the only correct, method of computing heating surface?

The following are some reasons, good or bad, which are likely to be urged against it.

1. The makers of fire-tube boilers will claim that this gives the water-tube boiler makers an advantage. With the same number of tubes in a boiler, of the same length, the water-tube boilers can show 7 to 11 per cent. greater heating surface. This is of course true; but is it not an advantage to which the water-tube boilers are fairly entitled?

It must be remembered that nowhere in this discussion has it been claimed that there was any fixed heat transmitting value for heating surface. On the contrary, it is entirely certain that a square foot of heating surface in one type of boiler may have double the heat transmitting power of an equal area in another.

Again, the relative facility with which heating surface can be cleaned of soot and ash counts for a vast deal, more than most steam users are accustomed to think. It certainly seems that the makers of fire-tube boilers have enough valid arguments to offer for their product without demanding the privilege of overstating their heating surface by 7 to 11 per cent.

2. Another argument offered for the use of the exterior surface as the heating surface is that this makes a given boiler show a larger heating surface than if the interior were taken. However much the argument may appeal to boiler manufacturers—and I hardly think they will take it very seriously—it deserves no weight with engineers. A foot rule is no longer for calling it 13 inches.

3. It is urged that practice is and has in the past been fairly uniform in accepting exterior area as the heating surface, and it is best to stick to a uniform practice, even if it be in error, than to change. If the practice were actually uniform, there might be reason in this argument; but while the majority of engineers probably use the exterior surface of tubes in computing heating surface, there is a very respectable minority which insists on the correct method of computation, and this minority shows no signs of decreasing.

4. As the outside diameter of the tube is even inches and the thickness of tubes varies, it is easier to compute the exterior heating surface than the interior. Probably this is one of the principal reasons why the outside surface has so frequently been taken; but in these days of tables and pocketbooks and aids to computation, so trifling a matter as computing the interior area of a tube ought not to be an excuse for perpetuating an error. As a matter of fact, it will generally be less labor to do this than it is to figure the cost of the tubes with the numerous series of discounts which are frequently found on hardware bills in these days.

KANSAS LEAD AND ZINC.*

The only locality in the State which has ever produced lead or zinc ores in paying quantities is the extreme southeast part of Cherokee county. Here the ores of each of these metals exist in phenomenal richness.

HISTORICAL.

It was in April, 1876, that the first discovery of lead ore was made in the county. For years similar mines had been in operation at Joplin and Granby and adjacent points in Missouri. In general character the surface rocks in this part of Kansas were known to be the same as those which produced the ores in Missouri. Different parties had prospected here and there up and down the little creek called Short creek, but nothing of value had been found. In April, 1876, while digging a hole, ostensibly for a well, on the farm belonging then to a Mr. Harper, a well digger was fortunate enough to come upon a mass of the purest lead sulphide (galena). No sooner was the fact noised abroad than different companies applied to Mr. Harper for the purchase of his farm, offering what seemed to be fabulous prices. Finally a company, composed principally of gentlemen from Baxter Springs, procured the land and immediately began prospecting for ore. Mining lots and town lots were surveyed, mining leases let, and temporary buildings erected, forming the new town which was rapidly springing into existence, and which was known as Bonanza, a name still borne by that particular locality.

Mining operations, however, were prosecuted slowly during the summer, largely from the fact that but few rich deposits of ore were found. The rapid growth of the village during the first few months gradually became checked, and twelve months from the time of the discovery there were perhaps fewer people living there than at the end of the first sixty days after the discovery was made.

In the spring of 1877 the same prospector, while digging in Short creek valley about a mile above Bonanza, came upon a large body of pure lead ore which produced hundreds of dollars' worth of the ore. Again the excitement was renewed. Land was purchased; mining lots surveyed and leased; town lots bought and sold; and the narrow valley of Short creek soon changed from the quiet corn field of a farmer into the busy scene of activity and turmoil known only to few mining towns of the world. Almost every shaft that was sunk found large quantities of lead ore near the surface. Two rival town companies came upon the scene, one of which got control of a considerable part of the land on the south side of the creek, and named the town Galena; the other of which controlled the greater part of the exceedingly productive valley and the upland to the north. This company named its town Empire City. The story of the remarkable development of this area has been told in many newspapers from that time. It now sounds almost like a fairy tale; yet the same men who took part in the development of the mines and the establishment of municipal government in this little Short creek valley in 1877 still are living on the ground they then purchased, many of whom have become prosperous beyond the limits of reasonable hope in those early days. It is estimated that within three months from the discovery of ore in this second locality not less than twelve or fifteen thousand people had camped upon the grounds.

The first mining operations were crude in

*From the Annual Bulletin on Mineral Resources of Kansas for 1897, by Francis H. Worth, Jr., Director of Physical Geography and Mineralogy, University of Kansas, Lawrence, Kansas.

method and detail. The lead ore was found near the surface, so that but little hindrance was met with by water in the shafts. Chaos reigned supreme in local government. No one attempted to keep accurate account of the output of the mines, so that it will always be a matter of conjecture regarding the first few months' or even few years' operations. This chaotic tendency was increased by the mutual jealousy of the two town companies and the discord which resulted.

It was only a short time, however, until matters assumed a much more quiet and substantial form. Regular mining companies were organized; each controlled the properties belonging to it and conducted its operations in a systematic manner. The income from the ores brought vast sums of money into this country from the outside. Thousands of people were entirely dependent upon the success of the mines or upon the wages for a day's labor. The citizens of the adjacent farming communities soon learned that they also were to be greatly benefited by the development of the mines, for a strong and steady demand was supplied for all of their products, and was brought almost to their very doors. Of the millions of dollars received for the lead ores and the zinc ores sold from Galena, a large portion has been immediately distributed throughout the farming communities near by. In this way, beneficial results have reached the whole community.

(To be Continued.)

PERSONAL NEWS ITEMS

EDWARD DITTMAN, a Mexican mine owner, is in San Francisco, Cal.

W. G. LUMMIS the mining man of St. Charles, Bear Lake county, Idaho, is now in Republic Camp, Washington and writes that Republic camp is "a dandy."

GEO. H. ROBINSON, the well known mining engineer of Salt Lake City, Utah, was in Basin, Montana, examining some promising mining properties. The old Hope mine among others coming under his observation.

H. SHALLENBERGER, of Spokane, who is extensively interested in the Boundary creek, B. C. district, is getting together a representative collection of the ores of the district which will be taken to Scotland by another party who will go across the water soon to interest Scotch capital in the Boundary country.

J. SULLIVAN and J. H. FREDERICKS, representing the J. Geo. Leyner Machinery Co. of Denver, Colo., is now in the state Michoacan, Mexico, putting up a plant on the Inguaran Copper properties in that State.

HON. E. W. MILLER, of Elk Point, S. D., well known in both the eastern and western parts of the state, arrived in Deadwood, S. D. Mr. Miller will remain some time in the Hills, and will pay considerable attention to his mining ground in Grizzly gulch.

RICHARD M. JESSUP of New York has a position with the Gold Coin Mines Company and Gregory Consolidated Mines Company, Gilpin County, Colo.

JOSEPH L. GIROUX, manager of the big mines at Jerome, Arizona, the United Verde Co's properties, is at present in Hermosillo, Sonora, Mexico, on important mining business.

After a sojourn of several days in Denver, Col., M. H. DAY has returned to the Black Hills, S. D. He went to Denver for the purpose of engaging the services of one or more men to take charge of the new chlorination works, at Rapid City.

It is a well known fact that when the Jos. Dixon Crucible Co. does anything they always do it in first-class style. They have been making Christmas presents and the same rule applies here too. We can attest to the fact. A package containing an assortment of Dixon's "American Graphite" Pencils was received at this office as one of their presents, having been selected specially for editorial purposes, and for which we herewith extend our most sincere thanks. The Dixon pencils are well known for their superiority.

GEORGE KISLINGHURY has returned to Utah from British Columbia.

W. KREUGEL, of Detroit, Mich., is in Central City, Colo., to look after his interests in the Alpha Gold Mining Company.

HARTWIG A. COHEN, who has recently resigned the general management of Captain J. R. De La Mar's mining enterprises is in New York where he has opened an office as mining engineer.

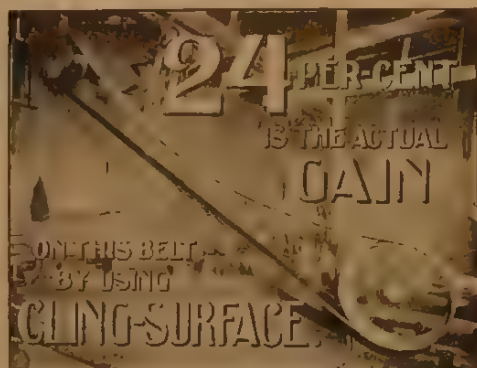
DR. GEORGE W. MAYNARD, a New York mining engineer, is in California in the interest of a foreign mining syndicate.

SAM T. JONES, a brother of Senator John P. Jones of Nevada has been recently visiting various points in Sonora, Mex. Last week he was out to see Colonel W. S. Morrow's properties at Mesaquehada, about thirty miles southeast of Minas Prietas.

FRANK NICHOLSON, having completed his engagement as general manager of the Consolidated Gold Fields of Mexico, Limited, at Santa Elena, Mexico, has returned to New York, where he will establish an office as consulting mining engineer and metallurgist.

F. AUG. HEINCE is in New York on what purports to be most important business. It is said that on his return to Butte, Mont., he will, in all likelihood, assume the management of the Butte & Boston Co.

MARSHALL P. WRIGHT of Kansas City is south of Matape in the Ures district of Sonora, Mexico, where he has recently denounced some very promising properties he is preparing to work on an extensive scale.



If You Have Only ONE BELT THAT SLIPS USE

CLING-SURFACE ON IT

and we will guarantee that the increase in power will pay for all the CLING-SURFACE required for the whole plant.

This 24 per cent. means
EIGHT HORSE POWER
gained per year with at least **\$300.00**

CLING-SURFACE MFG. CO.,

167-172 Virginia St., BUFFALO, N. Y.

A Practical Test ...

We asked a man the other day what he thought of our pumps.

"Well," said he, "I've used this pump for twenty years, and it's better than most pumps yet."

The best material, workmanship and patented construction—that's why our pumps wear.

Are you going to buy—Write us for full information and catalogue. All free for the asking.

W. T. GARRATT & CO.,
Pump, Bell, Brass and Machine Works,
138-142 Fremont St., San Francisco, Cal.

MINERALS WANTED +



Gold and Silver Quartz Specimens, Crystals, Opals, Turquoise, etc., etc.

Buy in Any Quantities—Pay good prices—Cash

E. C. MOLLER,

538 EAST 86th STREET,

NEW YORK



The Pulsometer Steam Pump

"THE MINER'S FRIEND"

Often Imitated—Never Equalled

Over 20,000 In Use

RECENT IMPORTANT IMPROVEMENTS

The Handiest, Simplest and Most Efficient Steam Pump for General Mining, Quarrying, Railroad, Irrigation, Drainage, Coal Washing, Tank-filling and for Pumping back Liquids heavily impregnated with sediment. Muddy or gritty liquids handled without injury to the Pump.

AGENTS

PARK & LACY CO., A. M. HOLTER BROS. CO., MITCHELL-Lewis & STAYER CO.
San Francisco, Cal. Helena, Mont. Portland, Oregon.

CATALOGUE ON APPLICATION
CORRESPONDENCE SOLICITED

Pulsometer Steam Pump Co.

133 Greenwich Street, New York City

THE MARKETS.

All quotations, financial reports and other statistical figures given under this head are New York Quotations, unless otherwise stated in each item. These figures are carefully revised each issue, and constitute a very accurate compilation of statistical matter.

NEW YORK, Dec. 28th, 1899.

The following are the Silver, Copper and Lead quotations for the last two weeks:

	SILVER	COPPER	LEAD
Dec 11	12 80	12 80	6 7 1/2
" 14	12 70	12 70	6 6 1/2
" 15	12 70	12 70	6 7 1/2
" 16	12 70	12 70	6 7 1/2
" 17	12 70	12 70	6 7 1/2
" 18	12 70	12 70	6 7 1/2
" 19	12 70	12 70	6 7 1/2
" 20	12 70	12 70	6 7 1/2
" 21	12 70	12 70	6 7 1/2
" 22	12 70	12 70	6 7 1/2
" 23	12 70	12 70	6 7 1/2
" 24	12 70	12 70	6 7 1/2
" 25	12 70	12 70	6 7 1/2
" 26	12 70	12 70	6 7 1/2
" 27	12 70	12 70	6 7 1/2
" 28	12 70	12 70	6 7 1/2

SILVER.

The silver market has been quiet, with business done at slightly declining rates. It is to be noted, however, that the rates for spot and future have been converging so that March silver has commanded a price only a little under metal for prompt shipment.

COPPER.

The demand, as is usually the case at this season of the year, is slow, but inasmuch as producers have all they can do to fill contracts previously entered into, what little business was transacted was done at slight concessions, for Lake at 12 1/2 @ 12 7/8. For electrolytic in cakes, wirebars and ingots, at 12.30 @ 12.55c; for cathodes at 12.30 @ 12.37 1/2, and casting copper at 12.37 1/2 @ 12.50c.

LEAD.

Lower prices have again been established as a result of some of the lots which were shipped from the West prior to the close of navigation being forced on the market. Several hundred tons were sold at the beginning of the week at 3.60c.

We quote 3.62 1/2c. New York, and 3.50 @ 3.52 1/2c. St. Louis.

SPELTER

The demand continues fairly steady but is no longer as brisk as it was during the few preceding months. There is quite a disposition on the part of sellers to meet the demand, the quotation being 5.05 @ 5.10c at St. Louis and 5.20 @ 5.25c. at New York.

ANTIMONY.

Antimony continues strong, and we quote Cookson's 9 1/2c; Hallett's, U. S. Star and Japanese, 9 1/2c.

NICKEL.

Business still continues on unchanged lines and no alteration in prices can be reported. We quote for New York ton lots 33 1/2c. and 36c per lb and for smaller orders 35 1/2c. and 38c.

GOLD

Although the London cables reported a serious break at the beginning of the week, prices here have remained fairly steady on account of supplies being rather meagre. We quote the metal at 18.12 1/2 @ 18.25c.

PLATINUM.

Prices are now quoted at \$15 and \$16 per oz., New York. The London quotations are 59 @ 60 s per oz. Supplies are not large and prices are firm. For chemical ware, best hammered metal. In lots of 250 grams or more, 56c. per gram; in lots of 100 grams or more, 57c. per gram; less than 100 grams, 58c. per gram; un-

manufactured platinum will be supplied in same quantities at 2c. less per gram.

POTASSIUM CYANIDE.

Purified, 98 @ 99 per cent., in cases of 120 lb. at 3 1/2c. per lb. in 5, 10, 25 and 50 lb tins at an advance.

QUICKSILVER.

The New York quotations are unchanged at \$39.50. The London price is also unchanged at 7 lb. 6s. per flask, with 7 lb., 4s. named for second ends.

POWDER.

F. o. b., San Francisco: No. 1, 70 per cent. nitro-glycerine per lb. in carload lots, 15 1/4c; less than one ton, 17 1/4c. No. 1* 60 per cent., carload lots, 13 1/4c; less than one ton, 15 1/4c. No. 1* 50 percent., carload lots, 11 1/4c; less than one ton, 13 1/4c. No. 2, 40 per cent., carload lots, 10c; less than one ton, 12c. No. 2*, 35 per cent., carload lots, 9 1/4c; less than one ton, 11 1/4c. No. 2* 30 percent., carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car, 728 kegs, \$1.50 per keg; less car lots, \$2 per keg.

COKE.

The trade in coke at St. Louis is reported very quiet—a condition not unusual as the year draws to a close.

IN CAR LOTS, ST. LOUIS.

Connellsville fly coke 72-hr. Fry....\$4.85
New River....\$4.00 Pocahontas.... 3.90
Crushed..... 1.85
Gas works coke, lump, per bushel.. 1.10

BORAX.

The San Francisco market in Borax is firm with a good demand.

The market is quoted as follows:

Refined, in carload lots, in barrels..... 7 1/4
Refined, in carload lots in sacks..... 7
Powdered, in car lots..... 7 1/2
Concentrated, in car lots..... 6 1/2

THE MINOR METALS.

Quotations are given below for New York delivery:

Aluminum	
No. 1, 98 per cent. ingots, per lb.	1 1/2 @ 1 3/4
No. 2, 90 per cent. ingots, per lb.	1 1/4 @ 1 1/2
Roll sheets, per lb.	20 @ 22
Aluminum-Nickel, per lb.	1 1/2 @ 1 3/4
Bismuth, per lb.	\$1.40 @ 1.50
Phosphorus, per lb.	40 @ 45
Tungsten, per lb.	70 @ 75
Ferro-tungsten, 60 per cent.	60 @ 65

Variations in price depend chiefly on the size of the order.

CHEMICALS.

Deliveries on contract are good. New contracts have been taken, particularly for alkali. Much 1899 business has been done in domestic caustic soda, and as low as \$1.30 f. o. b. works is reported as the contract price.

CAUSTIC SODA.

Quotations for Caustic soda domestic high test are \$1.40 @ 1.45 per hundred lbs.

ALKALI.

Domestic, 58 percent., 50c. @ 55c., foreign 55c. @ 60c. from dock as to style of package.

CARBONATED SODA ASH.

58 per cent., 90c and 95c. per 100 lbs. basis 48 per cent.

BI-CARBONATE OF SODA.

English, \$2.12 1/2 @ \$2.25 per 100 lb. American, bulk \$1.25 and \$1.50 per 100 lbs. according to brand.

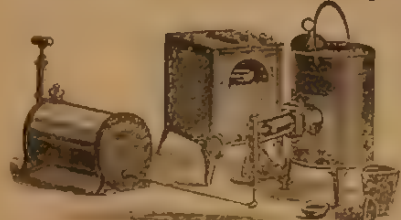
SAL-SODA.

For domestic, 50c. per 100 lb., less usual discounts; English, 65c. @ 67 1/2c., Concentrated sal-soda, \$1.60 @ \$1.65 per 100 lbs.

CHLORATE OF POTASH.

Chlorate of potash is quoted at \$9.50 and \$9.75 per 100 lbs.

Hoskins' Patent Hydro-Carbon



Blow-Pipe and Assay Furnaces

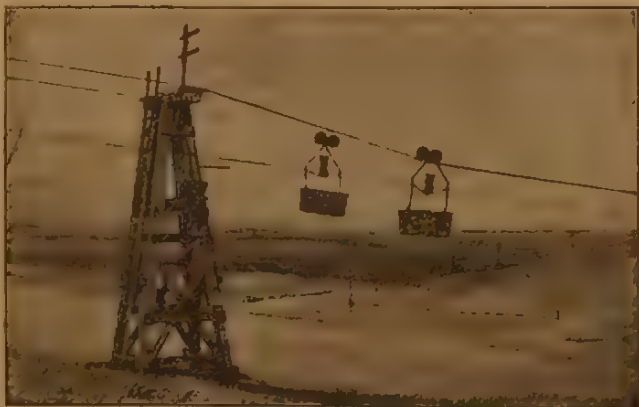
No dust. No ashes. Cheap, effective, economical, portable and automatic. Send for Price-list to

WM. HOSKINS,

81 South Clark St., Room 57
CHICAGO, ILL.

The Bleichert Wire Rope Tramway

And Other Systems of Aerial Transportation



Bleichert Tramway of the Solvay Process Co. transporting rock

MANUFACTURED BY THE TRENTON IRON CO., TRENTON, N. J.

Engineers and Contractors, and sole licensees in North America for the Bleichert System. Also Wire Rope Equipments for Surface and Underground Haulage, etc.

NEWTON A. BELL, Agent,

190 California St., San Francisco, Cal.

BELTING Leather, * Cotton, Rawhide, etc. ALSO Lace Leather

L. P. DEGEN, Manuf'r

Agent for Rubber Belting, Hose and Packing.

105 and 107 Mission Street, San Francisco, Cal.

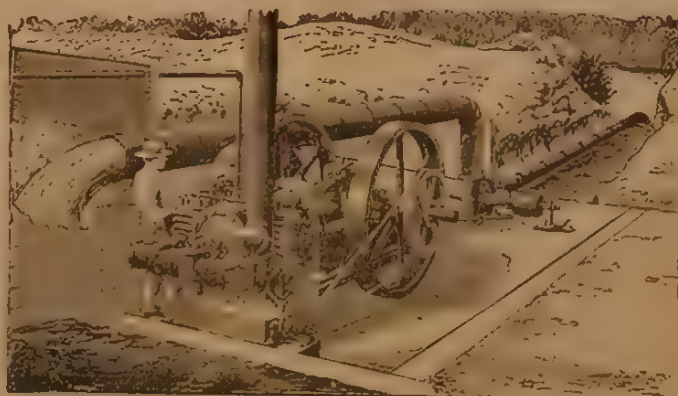
JAMES IRVING & CO. REFINERS ASSAYERS



Largest and most complete establishment in Southern California Cyanide and Mill Test.

Mint Prices paid for Gold and Silver Bullion. Returns made within four hours after receipt.

128 N. Main Street (Old Location) Los Angeles, Cal.



LARGEST GASOLINE PUMPING PLANT IN THE WORLD

The illustration shows the gigantic pumping plant recently built by the Hercules Gas Engine Works at the Packer Ranch, Colusa Co. 80 h. p. Hercules Engine, pumping 7200 gallons a minute, 27 feet high. Burns Gasoline or Distillate oil. Cheapest power known. Gas Gasoline and Oil Engines, 2 to 200 h. p. Send for Catalogue. HERCULES GAS ENGINE WORKS, 316 Bay St., San Francisco.

CHLORIDE OF LIME.

English prime brands \$1.60@\$1.70,
American, \$1.70@\$1.80; Continental F.,
\$1.60@\$1.60 per 100 lbs.

Acids.

Spot business is only fair, while for next year's delivery a few more contracts have been booked. Oxalic acid has been reduced by the syndicate to 6½¢; thus the jobbers who have bought heavily at 6½¢. are now in a predicament.

Quotations are per 100 lb from New York and vicinity as follows: Acetic acid, commercial, No. 8, \$1.40@\$1.60; muriatic acid, 18°, \$1.10@\$1.75; 20°, \$1.20@\$1.87½; 22°, \$1.35@\$2.25; according to quantity and brand. Nitric acid 36°, \$3.60@\$4.75; 38°, \$3.75@\$4.62½; 40°, \$4.00@\$4.87½; 42°, \$4.62½@\$5.25. Oxalic acid, \$6.50@\$6.75. Mixed acids, according to mixture. Sulphuric acid, 66°, \$1.10 for drums and \$1.15@\$1.75 for carboys. Chamber acid 50°, in jobbing way, \$1.50@\$1.25 per ton f. o. b. factory. Blue vitriol \$3.50 to \$3.62½ for extra grades and \$3.37½ for ordinary.

BRIMSTONE.

The market has eased off on the arrival of 2,400 tons, and spot best unrefined seconds can doubtless be had at \$21 per ton, while futures are obtainable at \$19.50@20 per ton. Thirds are nominal at \$18.50@90. The shipments of brimstone from Sicily to the United States in November, were 7,300 tons.

NITRATE OF SODA.

Buyers and sellers of nitrate of soda are still to far apart to come to any large sales, though about 5,000 bags were sold recently at \$1.52½ per 100 lbs. Sellers are quoting up to \$1.55 for spot, and for futures extending through December, 1899, \$1.55 to \$1.57½ per 100 lbs.

FINANCIAL NOTES.

Average Prices of Metals

in New York per pound from January 1,

1898:

Month	Copper	Tin	Lead	Spelter
January	10.99	13.87	3.65	3.61
February	11.28	14.08	3.71	4.01
March	11.95	14.38	3.72	4.25
April	12.14	14.60	3.83	4.26
May	12.00	14.39	3.64	4.27
June	11.80	15.22	3.82	4.77
July	11.53	15.60	3.95	4.66
August	11.89	16.23	4.00	4.58
September	12.39	16.03	3.99	4.67
October	12.41	17.42	3.78	4.98
November	12.86	18.20	3.70	5.29
December				

Average Monthly Prices of Silver.

In New York per ounce Troy, from January 1st,

1898, and for the years 1897 and 1896:

Month	1898	1897	1896
January	66.77	64.79	67.18
February	68.07	64.67	67.67
March	64.90	63.06	68.10
April	66.02	61.86	67.92
May	66.98	60.42	67.78
June	68.01	60.10	68.00
July	69.06	60.51	68.76
August	69.64	61.19	67.34
September	69.68	60.24	68.08
October	69.02	57.67	68.05
November	60.60	57.91	64.93
December		58.01	65.21
Year		59.79	67.75

The statement of the United States Treasury, on Thursday, Dec. 8th, shows balances in excess of outstanding certificates as below, comparison being made with the statement for the corresponding date last week:

	Dec. 1,	Changes.
Gold	\$244,888,719	I. \$2,425,276
Silver	6,842,551	I. 106,110
Legal Tenders	14,972,531	I. 217,551
Treas'y Notes, etc.	1,057,619	I. 354,179

Totals ... \$266,961,420 I. \$2,997,768
Treasury deposits with national banks amounted to \$96,389,061, an increase of \$1,748,060 during this week.

Gold and Silver Exports and Imports.
At all United States ports, October 1898, and year from January 1st, 1898 and 1897:

	OCTOBER, 1897	1898
Gold—		
Exports	\$13,311	\$1,279,946
Imports	11,775,483	16,227,358
Balance	\$1,142,172	\$14,947,432
Silver—		
Exports	\$5,225,437	\$4,572,827
Imports	3,283,433	2,512,797
Balance	\$1,942,004	\$1,960,030
TOTAL MONTHS.		
1897		1898
Gold—		
Exports	\$32,989,302	\$14,061,849
Imports	15,386,318	143,628,095
Balance	\$17,602,984	\$129,566,246
Silver—		
Exports	\$47,832,111	\$34,946,377
Imports	17,614,680	24,974,164
Balance	\$30,217,431	\$10,592,163

This statement includes the exports and imports at all United States ports, the figures being furnished by the Bureau of Statistics of the Treasury Department.

* WANTS *

Advertisements of this class containing not more than five lines will be inserted for not exceeding three months in any year, free of charge, to all paid-up annual subscribers.
Other than above \$1.00 per month.
Advertisements not accepted for less than one month.

WANTED POSITION of Assayer with Mining Company. Have had experience in Milling and Cyanide works besides technical chemical training. References given. Refractory ores treated by Bromo-Cyanide method. Address, Tye JOURNAL Office.

WANTED, by a young man, a position as Assayer, etc.; experienced, competent and has a good knowledge of all metallurgical operations. Good references. Address, T. K. JOURNAL OFFICE.

EXPERIENCED Assayer and Cyanide operator desires engagement. The successful and economical treatment of silmy ore or tailings by cyanide a specialty.
Address W. V. WATSON, Ely, White Pine Co., Nev.

AN EDUCATED Chemist and Millman, thoroughly understands Milling, Chlorination and Cyanide Processes. Twelve years experience in Montana and Colorado, now open to an engagement. Moderate salary. Address: "Chemist" JOURNAL OFFICE.

MINING MAN of experience will develop Gold property of merit for ¼ interest, or will bond whole mine and develop. Correspondence with owners only. Give full particulars. Will give satisfactory references. Address P. O. Box 887, Los Angeles, Cal.

FOR SALE!

4-STAMP, 650 lbs, with plates, feeders, etc., on + cars free, \$400, condition guaranteed; Engine and boiler, new, \$250; also 2-stamp live steam mill; 2-stamp Fulton Engine Works; and 10-stamp mill with concentration and power cheap; condition guaranteed; also 3-stamp mill complete; **PARSONS & HAWKINS**, 247 Wilcox Bldg., Los Angeles

A COMPLETE 20-stamp mill and equipment including assay office outfit, see ad page 24. Address, Box 234, LORDBURG, N. M.

WELL DEVELOPED quicksilver property located in Western Texas. Has produced 4000 pounds of quicksilver. Address, **LOUIS LINDHEIM & Co.**, Del Rio, Texas.

CALIFORNIA MINING LOCATION NOTICES.

BELL'S California Mining Location Notices conform to the mining laws of California and the United States. Mailed for fifty cents per dozen. **J. BELL**, Publisher, Los Angeles, Cal.

ANTIMONY **BISMUTH**
PROSPECTORS having locations of this nature and wishing to sell at once for cash, will do well to address with full particulars, P. O. Box 2078, SAN FRANCISCO, CAL.

A VERY valuable, extensive Lead Mining Property in Southwest Virginia. Shaft sunk over 200 feet and actual work has demonstrated richness of veins and purity of ore. Address: **GEORGE FRANK**, Baltimore, Md.

OPPORTUNITY.
GOLD, COPPER AND IRON MINING is profitable and respectable when you have the pay ores to mine. Because of owning more than we can properly manage, we propose to lease one or more valuable mines on equitable terms. Call or write **VAN ANDA COPPER & GOLD COMPANY**, 1000 of Court Building, Vancouver, B. C. Van Anda City, Texada Island, B. C. 65 Wall Street, New York City.

THE NATIONAL IRON WORKS



Riveted Boilers, Tanks, and Sheet Steel or Iron Work of every description.

MANUFACTURERS OF THE

National Steel Ore Car

Repairing of All kinds Promptly Attended to. **PORTLAND, OREGON**

Dividend Paying and Investment Mining Stock

W. E. HUBBARD & CO.,

Tel. 505

15 W. 2d South St., Salt Lake City, Utah

FULTON ENGINE WORKS

Mining, Milling & Smelting Machinery

Estimates Furnished on all Classes of Mining Work

P. O. Box 296, STATION "C"

LOS ANGELES, CALIFORNIA

Bullock's Diamond Prospecting Core Drills

These are the only Machines which will give absolutely accurate records of borings. Fifteen styles and sizes. Operated by hand, horse, steam, air or electricity.

Monarch Rock Drills

Any style of mounting. Simple, compact, economical. Operated by air or steam
Hoisting and Haulage Machinery to fill any requirements.

M. C. BULLOCK MFG. CO.,

1169 West Lake Street,

CHICAGO, ILLINOIS

Chas. P. Grimwood,

Mining Engineer and Metallurgist

Laboratory, 214 Pine Street,

SAN FRANCISCO, CAL.

Oilless Bearings,



For

Rope Tramways, HOISTING
Engines, Tackle Blocks,
Cam Shafts in STAMP
MILLS. A Practical BEARING that
RUNS WITHOUT OIL.

The Graphite
Lubricating Company
BOUND BROOK, N. J.

ADOLF FRESE

ENGINEERING INSTRUMENTS

Barometers, Thermometers, Field Glasses, Microscopes and Accessories. Repairing Promptly Done.

126 S. Spring St., LOS ANGELES, CAL.

A. F. JUDSON, E.M.

Geologist and Mining Engineer,

Mines Examined and Reported on.

COLTON, CALIFORNIA

A. A. WARREN

ASSAYER AND
ANALYTICAL CHEMIST

COLTON, CALIFORNIA

FOR SALE.

One Hall's Patent Excavator 450 Spread, including Boiler and Lidgerwood Engines. (Double) 8"x8" Cylinder.
One 60 H. P. Locomotive Boiler and all necessary fittings.
One 60 H. P. Erie Engine and all necessary fittings.
One 50 H. P. Heater and Pump, (Boiler Feed),
One No. 8 Sand Pump, Hose and all connections.
One Copper Plate which is silver plated, 48"x60" and a lot of Piping, Scales, etc.
Plant now set up in place in New Mexico. Will sell for ½ original cost and guarantee to be in good order. If interested, correspond with

The S. S. Machinery Co., Denver, Colo.

WM. T. SMITH

22 Years Experience

R. A. ANDERSON

WM. T. SMITH & CO.

ESTABLISHED PROVIDENCE, R. I., 1854
LOS ANGELES, CAL., 1893



Refiners and Assayers,

Bullion Buyers, Mining Experts,
Constructing Engineers
REFERENCE, CALIFORNIA BANK

114 N. Main Street,

Tel. Brown 1785 Los Angeles, Cal.

MINING STOCK QUOTATIONS

BOSTON	
Aetna Con	4.00
Albion	6.13
Arcadian	39.38
Arnold	12.75
Ash Hed	2.50
Atlantic	32.50
Baltic	28.00
Bonanza	1.27
Boston & C	62
Boston & Mont	240.00
Brecon	—
Bulle & Boston	68.50
Calumet & Hecla	10.00
Catalpa	25.00
Centennial	26.00
Crescent	16
Dominion Coal	33.00
Dominion Pref	110.50

ROSSLAND, BRITISH COLUMBIA	
Aetna	10
Big Three	15
Butte	04
Caledonia Con	05
Coloma	28
Commander	12
Deer Park	19
Enterprise	18
Eureka Con	05
Evening Star	05
Georgia	12
Gertrude	02
Good Hope	12
Grand Prize	03
Great Western	09
Hattie Brown	03
High Ore	03
Iron Mask	03
Iron Colt	10
J. L. L.	10
Josie	30
Josie Mac	45
Jumbo	47

SAN FRANCISCO	
Alta Con	12
Andes	13
Belcher	21
Best & Belcher	10
Bullion	10
Caledonia	52
Challenge	12
Chollar	10
Confidence	40
Con. Cal. & Va.	33

Crown Point	10
Dracwood	45
Gould & Curry	15
Hale & Norcross	85
Homestake	50.00
Iron Silver	08
Justice	08

COLORADO SPRINGS STOCKS	
Acacia	02
Alamo	02
American Con	01
Anaconda	37
Argentum Juniate	20
Banner	13
Rob Lee	01
Creede & C	01
Dante	04
Des Moines	01
Elkton Con	88
El Paso	03
Emm. Almo	03
Fanny R.	21
Favorite	02
Findley	05
Flower of the West	00
Golden Crater	00
Golden Fleece	22
Gold & Globes	01
Gold King	55
Gould	08
Gravel Hill	01
Hayden	00
Ingham Con	04

SALT LAKE CITY	
Alice	75
Alta	30
Alliance	38
Anchor	50
Buckeye	05
Bullion Rock	5.25
Calumet	38
Chloride Point	1.38
Daisy	84
Dalton	01
Dalton & Lark	07
Daly	45
Daly West	4.45
Dexter	3.15
Ragle	08
Ragle & Blue Bell	1.87
Four Aces	48
Galena	80
Geyser-Marion	10
Golden Eagle	09
Grand Central	8.00
Homestake	05
Horn Silver	1.15

NEW YORK	
Adams Con	08
Alamo	05
Alice	50
American Gold	08
Anaconda Gold	20
Belcher	42
Best & Belcher	85
Breece	13
Brunswick	13
Caledonia	60
Canon Hill	03
Chollar	24
Chrysolite	13
Comstock Tunnel	04
Comstock Stocks	04
Comstock Script	04
Consolidated Imp	03
Con. Cal. & Va.	14
Copper Rock	00
Cr. & Cr. Creek	05
Crescent	15
Crown Point	15
Cripple Creek Con	10
Deadwood	40
Elkton Con	35
Enterprise	1.18
Flower of the West	01
Garfield Con	01
Gold & Globes	03
Gold King	03
Golden Fleece	25
Gould & Curry	22
Hale & Norcross	1.70
Homestake	5.00
Horn Silver	1.15
Isabella	29
Iron Silver	22

DENVER STOCK REPORT.	
Aetna	001
Anchor Leland	07
Anaconda	07
Arcadia	01
Argentum Juniate	20
Banner	—
Bob Lee	01
El Paso	07
Enterprise	04
Fanny R.	21
Garfield Grouse	—
Geo. Washington	002
Golden Eagle	23
Gold King	80
Gliffin & C	40
Gliffin Four	004
Golden Fleece	22
Isabella	23

Iron Clad	02
Jack Pot	02

Wheel of Fortune	002
Work	1/20

MEXICO		
Name of Company	State	Price
Alamosa	Hidalgo	8
Amistad y Concordia	"	24
Angustias	Guerrero	380
Arceles y Anexas	Hidalgo	240
Asturiana y Anexas	Zacatecas	170
Barradon y Cabras	Durango	150
Bartolome de Medina	Hidalgo	100
Cabezon y An	Zacatecas	30
Candelaria de Pinos	"	180
Capatzen	Durango	120
Carmen	Hidalgo	400
Castellana y San Ram	Tepe	25
Cerro Colorado	Chihuahua	10
Cinco Senores y An	Guerrero	400
Concepcion y Anexas	San Luis Potosi	100
El Oro	Guerrero	40
Reparacion y An	Mexico	1,200
Guadalupe	Guerrero	100
Huautla	Santa Ana	100
Luz de Horda	Michoacan	40
Luz de Maravillas	Hidalgo	150
Pabillon	"	150
Palma	Zacatecas	100
Paraiso de los Com	"	5
Real del Monte	Hidalgo	900
Refugio y Va	"	80
Restauradora	Durango	60
San Francisco	Hidalgo	270
q. Ped. Chalchihuites	"	12
San Rafael y Anexas	"	225
do. Free Stock	"	400
San Rafael del Oro	Hidalgo	20
Sta. Maria de la Paz	San Luis Potosi	850
Sitron	Durango	50
Soledad	Hidalgo	500
Sorpesa	"	250
Trinidad	Guerrero	40
Tlaxiungo	Puebla	27
Union	Hidalgo	250
Zomelahuacan (gold)	Vera Cruz	100
Zona Min de Pozos	Guerrero	15

Note.—The above Mexican stocks are figured on the basis of Mexican silver

ORE TESTING

Complete mill for testing ores on practical scale by all processes to determine the best process adapted to treating any ore submitted. Processes in use investigated to overcome unnecessary losses, etc.

RICKETTS & BANKS,

Metallurgists & Chemists

No. 104 JOHN STREET,

NEW YORK CITY

Krogh Manufacturing Company

Successor to San Francisco Tool Co.'s Machine & Milling Dept.

MANUFACTURERS OF AND DEALERS IN

MINING AND PUMPING MACHINERY,

COMPRISING

Krogh 2-Stamp Triple-DischARGE Quartz Mill, of latest improved pattern, Rock Breakers, Ore Feeders, Concentrators, Engines and Boilers, Hoisting Rigs to be operated by Horse, Steam Power or any other motor; Ore Cars and Ore Buckets, Cornish and Jack-head Pumps, Triple-Acting Pumps, Centrifugal Sand and Gravel Pumps, Wooden Tanks and Pumps for the Cyanide Process, Pipe and Gate Valves, Link Chain Elevators for elevating and conveying all kinds of material. Estimates as to cost of machinery and its erection furnished upon application. Write for Catalogue and Prices.

OFFICE AND WORKS AT

51 Beale St. and 9 to 17 Stevenson St.,

San Francisco, Cal.

ASSAY OFFICE

Lew. E. Aubury, E. M.

Cyanide Plants erected and operated. Practical Working Tests made. Mines Examined and Purchased.

115 W. First St.,

Opp. Notice House

Los Angeles, Cal.



The Southern California Lumber Co., Stimson Bldg., Los Angeles, Cal., Chas. Wier Manager, sells

LUMBER

At Wholesale Prices

Mining Timbers a Specialty

Write for Prices

FROM CRIPPLE CREEK

AIR COMPRESSORS,
ROCK DRILLS,
Stone Channelers,
The Pohle Air Lift Pump,
Coal Cutters,

New Catalogue No. 32

New Catalogue No. 41

Pamphlet No. 100

Catalogue No. 72

Special.

JAMES F. BURR, Pres't. JOHN HANNAN, Gen. Man.

THE PORTLAND GOLD MINING CO.

(Stock Transfer Office, Colorado Springs)

Mines at Victor, Colorado.

COLORADO SPRINGS, COLO., May 19, 1898.

The Ingersoll-Sergeant Drill Co.

Gentlemen:—We bought two years ago one of the largest size of the straight line type of Ingersoll-Sergeant Piston Inlet Compressor.

This was found to be too small for our needs about a year ago and we purchased of you a Duplex Corliss machine 16" x 18" x 43".

This was set in place in our shaft house in the Cripple Creek District, 10,000 feet above the level of the sea, and has been running continuously ever since, and at times over ten 1/2" Helix drills. The steam cylinders were connected to an independent Jet Condenser, for which we are using the mine water, and the resultant economy of operation is very noticeable.

The operation of this Compressor is as near perfect as that of any machine we have ever seen, and this type is well worth the extra cost on account of the great permanent economy in operation.

Our mine is equipped exclusively with your drills and we have only the highest words of praise to give them.

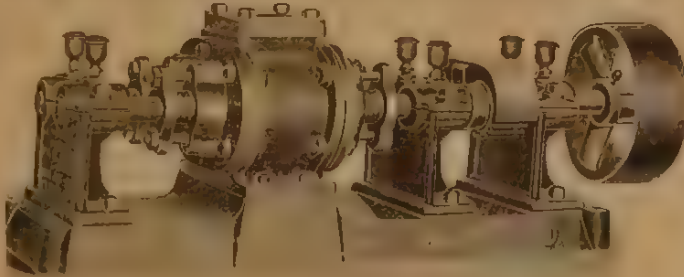
Yours very truly, The Portland Gold Mining Co.,

Jas. A. Burr, President

The Ingersoll-Sergeant Drill Co.,

HAVEMEYER BUILD'G.
NEW YORK.

The Improved WONDER Irrigation Pump



We also Build Vertical Style for Mining Purposes.
Write for full particulars and Catalogue.

Wonder Pump Mfg Co., KANSAS CITY, Missouri

ALL THE MINING CAMPS OF UTAH AND COLORADO ARE
LOCATED ON OR REACHED BY

The **Rio Grande Western Ry.**

THE SHORTEST, QUICKEST AND MOST DIRECT ROUTE TO

MERCUR AND CRIPPLE CREEK

MERCUR:

The Johannesburg of America, New and Wonderful Camp only 45 miles from
Salt Lake City, Utah.

CRIPPLE CREEK:

The Greatest Gold Camp in the World, only six years old and two hundred
shipping mines in the district.

P. R. WADLBIGH, GENERAL PASSENGER AGENT,
Salt Lake City, Utah

WHY Spend your money to buy new machinery to put on Un-
proved Mines which may not be a success when you can
buy **Pumps, Hoists, Shafting, Pulleys, Air-Compressors,**
Engines, Boilers and in fact any Machinery you need for a
Mine or Mill, as good as new, at the

Denver Variety Machine Shops, THOS. CROW, Prop.

Write for Prices and Particulars. 1712 Blake St., DENVER, COLORADO

N. OHLANDT & CO.

MANUFACTURERS OF

Best Quality of BONE ASH for Assayers.

Our Goods are used in all parts of the United States and Mexico.

EXTRA No. 1 and No. 2 CORRESPONDENCE SOLICITED
327 MARKET STREET, SAN FRANCISCO, CAL.



J. H. MASTERS,

Manufacturer of and Dealer in

Ore Sacks, Tents & Camp

Furnishings

215 Commercial St.,
LOS ANGELES, CAL.

Sulphuric Acid Manufactured by the **Denver, Col.**
Western Chemical Co.
For Chlorination, Refining and other
processes. Also Muriatic and Nitric
Acids, Blue Vitriol, Copperas Refined
Sulphate of soda, Etc.

THOMAS PRICE & SON

Analytical Metallurgical and Physical Testing Laboratory

524 SACRAMENTO STREET, SAN FRANCISCO, CAL.

COMPLETE CATALOGUE

Of Power Transmission, Appliances, Patent
cold rolled steel shafting, Cast Iron Pulleys,
Couplings, Ball and Socket self-oiling hang-
ers, Floor Stands, Wall Frames, Belt Tight-
eners, Wire Rope Sheaves, Band and Fly
Wheels, Rope Transmission. Also valuable
notes on engineering.

MINING AND MILLING MACHINERY

Hoisting Engines and boilers, Automatic Ore
Cars, Ore Buckets, Water Buckets, Blake
Crushers, Hark Digs, Hand Hoists, Hand
Winches, Whims, etc.

Catalogue mailed free to parties interested

The Midland Foundry and Machine Works Co.
DENVER, COLORADO

GASOLINE ENGINES

Gasoline Engines from 2 to 10 horse
power. Mine ventilators operated by
Gasoline Engines.

TEMPLE MACHINE CO.,

1513 Wazee Street, Denver, Colorado

Roller & Cummins.

CHEMISTS AND ASSAYERS

Gold and Silver Bullion Melted, Refined and
Purchased. Special Attention paid to Controls
and Umpires. Samples by mail or express re-
ceive prompt attention. Write for complete price
list and mailing envelope
1821 Arapahoe St., Denver, Colorado

Reliable Assays

Gold \$.50 Copper \$ 1.00
Silver40 Gold, Silver and Lead... 1.25
Gold & Silver... .75 Gold, Silver, & Copper... 1.50
Lead..... .50 Gold, silver, copper, lead 2.00
Samples by mail receive prompt attention.
Highest price paid for Bullion.

Ogden Assay Co.,

1429-16th Street, Denver, Colo.



A Complete
Line of
Drills
&
Pumps

Send for
Catalogue

UPRIGHT DRILLS

THAT ARE MADE BY

W. F. & JOHN BARNES CO.,

105 Ruby Street, Rockford, Ill.

ARE SOLD IN
San Francisco by
HENSHAW, BUCKLEY & CO.

Established 1872
F. E. BRADBIS, SONS & CO.
ENGINEERING
INSTRUMENTS
FOR ALL PURPOSES.
212-214 CATHY AVE., BROOKLYN, N.Y.
Catalogues mailed on application.

Founded by Matthew Carey, 1785.
HENRY CAREY BAIRD & CO.
Industrial Publishers, Book-sellers and Importers
810 Walnut St., Philadelphia, Pa., U.S.A.
Our new and revised Catalogue of Practical
and Scientific Books 92 pages, 8vo, complete to
February 1, 1898, and our other catalogues and
Circulars the whole covering every branch of
Science apply to the Arts, sent free of postage
to any one in any part of the world who will fur-
nish his address.



AINSWORTH NO. 1

Sensibility, - - - 1-200 Milligramme

This is a short beam balance and especially
adapted for smelters and assay offices where ex-
treme accuracy and rapidity are perquisites

Wm. AINSWORTH & SONS

2151 LAWRENCE ST. DENVER, COLO.

Assay Office and Ore Testing Laboratory

Of **HENRY E. WOOD, Assayer**

1734 ARAPAHOE ST., DENVER, COLORADO

Established in Colorado in 1876

Control and Umpire Assays a Specialty. Willey
Concentrator in Operation. Write for circular
giving prices, etc.

EAGLE PACKING



Also White Eagle, Graphite, Hydraulic, Nitr and
other brands for all purposes for which packing
is used. Write for samples and prices. Manu-
factured by **James Glandig Co.,**
1907-9 North 6th St., PHILADELPHIA, PA.

U. S. AUTOMATIC INJECTORS

Guaranteed to
be the

STEAM

Best and
Most
Economical

Injectors on
the Market

Can be had of



Mitchell Staver & Lewis Co. Portland or
Mitchell Staver & Lewis Co. Seattle, Wash
Schaw-Ingram Hatcher Co. Sacramento, Cal
Henshaw, Buckley & Co., San Francisco, Cal
And of Jobbers and Dealers generally.
Catalogue Free.

American Injector Co., Detroit, Mich.
U. S. A.

I. C. YAWGER, SUCCESSOR TO
VICTOR BISHOP & CO.

**IMPORTER OF
CARBONS
FOR DIAMOND DRILLS.**

21 MAIDEN LANE NEW YORK

INCORPORATED MINES PAYING DIVIDENDS.

	NAMES OF MINES	LOCATION	No. of Shares	Capital Stock	Par Value	Amount of Last Dividend	Date of Last Dividend	Total Amount Paid in Dividends	Kind of Minerals Produced
1	Acton Cons.	California	100,000	\$ 500,000	\$ 5	\$ 10	Oct 1898.	\$ 150,000	Q.
2	Alaska, Treadwell	Alaska	200,000	5,000,000	25	37½	July 1898.	8,560,000	G.
3	Alaska Mexican	Alaska	200,000	1,000,000	5	10	July 1898.	299,031	G.
4	Alice	Montana	400,000	10,000,000	25	05	April 1898.	1,075,000	G, S, L.
5	Anaconda	Montana	1,200,000	30,000,000	25	1 25	Nov 1898.	8,250,000	G.
6	Anchoria Leland	Colorado	600,000	600,000	1	01	Nov 1898.	168,000	G.
7	American Gold	Colorado	800,000	3,000,000	10	09	Oct 1898.	382,000	G, S, L.
8	Associated	Colorado	1,250,000	1,250,000	1	01	Nov 1898.	50,000	G.
9	Atlantic	Michigan	40,000	1,000,000	25	1 00	Feb. 1898.	780,000	G.
10	Aurora	Michigan	100,000	2,500,000	25	50	May 1898.	750,000	L.
11	Bad Butte	Montana	250,000	250,000	1	03	Oct 1898.	627,148	G, C, S.
12	Big Six	Colorado	500,000	500,000	1	00½	May 1898.	15,000	G, S.
13	Boston & Montana	Montana	150,000	3,750,000	25	6 00	Nov 1898.	9,125,000	G, C, S.
14	Breece	Colorado	200,000	5,000,000	25	05	Dec 1898.	30,000	L.
15	Bullion Beck and Champion	Utah	100,000	1,000,000	10	10	Dec 1898.	2,535,000	G, S.
16	Bunker Hill and Sullivan	Idaho	300,000	3,000,000	10	07	Nov 1898.	579,000	S, L.
17	Cariboo	British Col.	800,000	800,000	1	02	Aug 1898.	238,965	G.
18	Calumet & Hecla	Michigan	10,000	2,500,000	25	10 00	Sept 1898.	54,850,000	C.
19	Centennial Eureka	Utah	30,000	1,500,000	50	50	Dec 1898.	2,250,000	S, L.
20	Central Lead	Missouri	10,000	1,000,000	100	50	Nov 1898.	77,000	L.
21	Champion	California	34,000	340,000	10	25	April 1898.	295,200	G.
22	Charleston	S. Carolina	10,000	1,000,000	100	1 50	Sept 1898.	168,000	
23	Chloride Point	Utah	500,000	500,000	1	01	Dec. 1897.	5,000	G, S.
24	Colorado Smelting	Montana	100,000	1,000,000	10	50	July 1898.	1,595,000	G, S, C.
25	Crowned King	Arizona	600,000	6,000,000	10	02	Oct 1897.	208,000	G, S, L.
26	Deadwood Terra	S Dakota	200,000	5,000,000	25	05	May 1898.	1,350,000	G.
27	De Lamar	Idaho	400,000	2,000,000	5	29	May 1898.	2,451,800	S, L.
28	Dutch	California	150,000	1,500,000	10	04½	Feb 1898.	39,000	G.
29	Elkton Consolidated	Colorado	1,250,000	1,250,000	1	01½	Oct 1898.	836,961	G, S.
30	El Paso	Colorado	650,000	650,000	1	01	Jan 1897.	12,093	G, S.
31	Empire State	Idaho	75,000	750,000	10	10	Nov 1898.	35,000	
32	Enterprise	Colorado	500,000	500,000	1	05	Sept 1898.	900,000	S, L.
33	Fern	British Col.	200,000	200,000	1	05	Jan 1898.	110,000	
34	Geyser-Marion	Utah	300,000	1,500,000	5	02	Sept 1898.	90,000	G.
35	Gold Coin of Victor	Colorado	1,000,000	1,000,000	1	01	Oct 1898.	120,000	G.
36	Golden Cycle	Colorado	200,000	1,000,000	5	02½	Oct 1898.	155,000	
37	Gold Coin	Colorado	200,000	1,000,000	5	05	Nov 1897.	181,000	G, S.
38	Golden Reward	S. Dakota	250,000	1,000,000	15	15	Feb 1898.	155,000	G.
39	Grand Central	Utah	250,000	250,000	1	12½	Dec 1898.	217,700	G, S, C, L.
40	Halla Mines Ltd.	British Col.	250,000	1,250,000	5	25	May 1898.	160,000	
41	Highland	S. Dakota	100,000	10,000,000	100	20	Nov 1898.	3,761,718	G.
42	Holy Terror	S Dakota	300,000	300,000	1	03	Sept 1898.	117,000	G.
43	Homestake	S Dakota	125,000	12,500,000	100	50	Nov 1898.	7,118,750	G.
44	Hope	Montana	100,000	1,000,000	10	10	Mar 1898.	762,252	S.
45	Horn Silver	Utah	400,000	10,000,000	25	05	Sept 1898.	5,210,000	S, L.
46	Idaho	British Col.	500,000	500,000	1	05	May 1898.	261,000	
47	Iowa	Colorado	1,000,000	1,000,000	1	00½	June 1898.	80,000	G.
48	Iron Mountain	Montana	500,000	5,000,000	10	02	Apr 1898.	507,500	S.
49	Isabella	Colorado	2,250,000	2,250,000	1	00½	June 1897.	270,000	G.
50	Keamsboro	Michigan	40,000	1,000,000	25	10	Aug 1897.	180,000	C.
51	Kennedy	California	100,000	10,000,000	100	48	Aug 1898.	1,708,000	S, L.
52	La Roi	British Col.	500,000	2,500,000	5	10	Apr 1898.	775,000	G.
53	Lille	Colorado	1,000,000	1,000,000	1	01	Oct 1898.	146,110	G.
54	Minnesota	Minnesota	165,000	16,500,000	100	1 50	Oct 1898.	4,735,000	L.
55	Modoc	Colorado	500,000	500,000	1	01	Dec 1898.	110,000	G.
56	Montana Ltd.	Montana	600,000	3,300,000	5	05½	May 1898.	2,997,557	G, S.
57	Montana Ore Purchasing	Montana	40,000	1,000,000	25	1 00	Oct 1898.	800,000	
58	Morning Star	California	2,400	240,000	100	5 00	June 1898.	668,600	G.
59	Mt. Rosa	Colorado	1,000,000	1,000,000	1	02	Jan 1898.	60,000	G.
60	Mercur	Utah	200,000	5,000,000	25	12½	Nov 1898.	1,218,000	G.
61	Mammoth	Utah	400,000	10,000,000	25	05	Oct 1898.	1,330,000	G, S, C, L.
62	Moon Anchor Gold	Colorado	600,000	600,000	1	07½	Nov 1898.	281,000	G.
63	Mountain Copper	California	250,000	6,250,000	25	62½	Sept 1898.	93,750	C.
64	New York & Hon. Rosario	Central A.	150,000	1,500,000	10	10	Oct. 1898.	945,000	S, G.
65	Napa	California	100,000	700,000	7	20	Oct 1898.	950,000	Q.
66	New Idria Quick-silver	California	100,000	500,000	5	20	Sept 1898.	80,000	Q.
67	North Star	California	200,000	2,000,000	10	25	Nov 1898.	500,000	G.
68	Ontario	Utah	150,000	15,000,000	100	75	Dec. 1897.	13,542,500	S, L.
69	Oseola	Michigan	50,000	1,250,000	25	2 00	Dec 1898.	2,552,500	C.
70	Parrot	Montana	280,000	2,800,000	10	30	Oct 1898.	2,069,898	C.
71	Pennsylvania Consolidated	California	51,500	5,150,000	10	05	Oct. 1898.	46,500	
72	Pioneer	California	100,000	1,000,000	10	12½	Dec 1898.	50,000	G.
73	Portland	Colorado	3,000,000	3,000,000	1	02	Nov 1898.	2,250,080	G, S.
74	Princess	Colorado	1,000,000	1,000,000	1	00½	Feb 1897.	47,000	G.
75	Quincy	Idaho	100,000	2,500,000	25	3 50	Aug 1898.	10,120,000	C.
76	Rambler-Cariboo	British Col.	1,000,000	1,000,000	1	02	April 1897.	40,000	
77	Raven	Colorado	1,500,000	1,500,000	1	01	March 1898.	20,000	G.
78	Reco	British Col.	1,000,000	1,000,000	1	10	Jan 1898.	287,500	S, L.
79	Republic	Washington	1,000,000	1,000,000	1	03	Dec 1898.	90,000	G.
80	Sacramento	Utah	1,000,000	5,000,000	5	00½	Nov 1898.	87,000	G.
81	Santa Rosalia	California	100,000	100,000	1	10	Feb. 1898.	125,000	G, S.
82	Small Hopes Consolidated	Colorado	250,000	5,000,000	20	10	June 1898.	3,300,000	S.
83	South Swansea	Utah	150,000	150,000	1	05	Oct 1898.	125,000	S, L.
84	Standard	California	200,000	20,000,000	100	10	Aug 1898.	5,674,940	G, S.
85	St. Joseph	Missouri	30,000	3,000,000	10	1 50	Sept 1898.	2,747,000	L.
86	Silver King	Utah	150,000	3,000,000	20	25	Dec 1898.	1,800,000	S, L, G.
87	Slocan Star	British Col.	2,000,000	1,000,000	0.50	05	Mar 1897.	350,000	
88	Smuggler	Colorado	1,000,000	1,000,000	1	01	Oct 1898.	1,075,000	S, L, Z.
89	Swansea	Utah	100,000	500,000	5	05	Dec 1898.	136,500	S, L.
90	Tamarack	Michigan	60,000	1,500,000	15	3 00	June 1898.	5,331,000	C.
91	Victor	Colorado	200,000	1,000,000	5	50	Dec 1898.	1,135,000	G.
92	Vindicator	Colorado	1,500,000	1,500,000	1	05	Oct 1898.	180,000	G.
93	Western Mine Enterprise	Montana	500,000	500,000	1	20	Jan 1898.	48,680	
94	War Eagle	British Col.	2,000,000	1,000,000	1	01½	Oct 1898.	239,000	
95	Wolverine	Michigan	60,000	2,500,000	25	1 00	Oct 1898.	60,000	C.
96	White Water	British Col.	125,000	1,250,000	5	32	April 1898.	194,000	
97	Yellow Aster	California	100,000	1,000,000	10	10	Oct 1898.	148,789	G.

S, Silver. G, Gold. L, Lead. O, Copper. Q, Quicksilver. I, Iron. Z, Zinc.

N. B.—Companies not listed have not paid a dividend for the last twelve months.

The Denver Ore Car



Car will DUMP in an Direction; automatic; has few parts and less liable to get out of Order than any of the patent cars for handling ore. Send for catalogue No. 3 describing cages, wips, buckets, wheels and axles.



DENVER ENGINEERING WORKS,

Denver, Colorado

Mining Smelting Plants

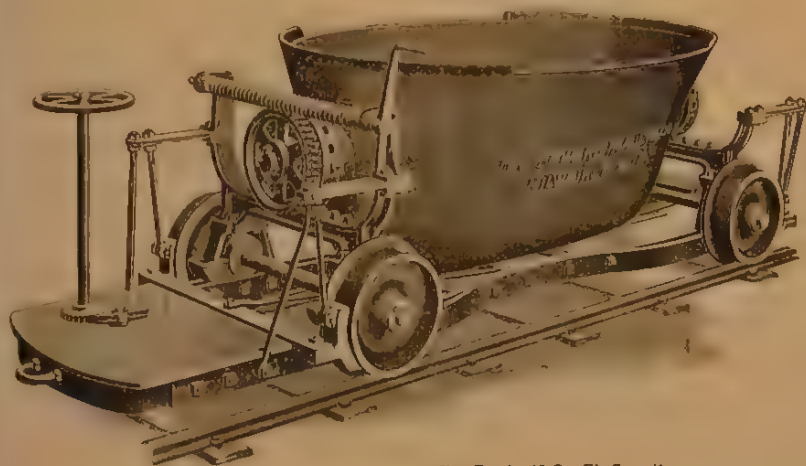
AND THEIR EQUIPMENT

BLAST FURNACES

CALCINING FURNACES

CONVERTERS

BLOWING ENGINES.



Slag Truck, 43 Cu. Ft. Capacity

The Edward P. Allis
COMPANY,

MILWAUKEE, WISCONSIN

CATALOGUES ON APPLICATION

SULLIVAN MACHINERY CO.

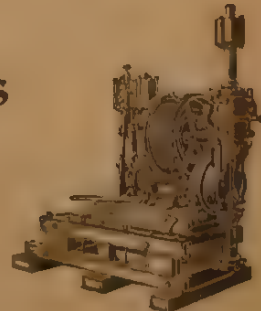
CHICAGO, ILLINOIS

Sullivan Diamond Prospecting Drills

FOR PROSPECTING FOR and DEVELOPING MINERALS

Rock Drills for Sinking, Drifting and Stopping

Knight & Stone, Agents, Spokane, Washington



Denver, Col. Office : 332 Seventeenth Street



The Detroit Lubricators Are Best for MINING ENGINES

They are extra strong and durable, each one being tested at 300 lbs. pressure before being sent out, and they are always Efficient and Reliable.

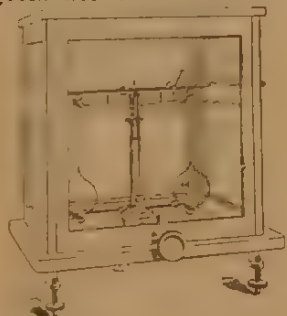
Over 400,000 of Them are in Use.

Send for Catalogue, giving full details

DETROIT LUBRICATOR CO.,

Detroit, Mich.

QUEEN NO. 4 ASSAY BALANCE



Aluminum Beam, Agate Knives and Planes Sensibility 1-100 mg. The Best Low-Price Assay Balance on the Market. Send for Circular.

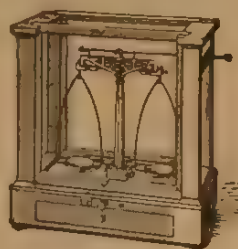
QUEEN & CO.,
Optical and Scientific Instrument Works
1010 Chestnut Street,
N. Y. Office, 59 Fifth Ave Philadelphia

ESTABLISHED IN 1840

HENRY TROEMNER,

170 Market St.,

Philadelphia, Pa.



Assay Balances and Weights

In use in all the U. S. Assay Offices in America

PRICE LIST ON APPLICATION

Spadone's Concentrator Belts Patented



This illustration shows the edge flanging outwardly as it passes over the pulley. This relieves the strain from the top and bottom of the edge by directing the strain automatically to the inside face surface of the edges. Heretofore all belts have been so constructed that when they pass over the pulleys or rolls, a direct strain comes upon the edges to break away from the body of the belts in a very short time. We avoid this Mechanical Defect by our Spadone Curved Edges. Belts made to fit any machine—4, 5 and 6 feet wide. Prices and samples on application.

Send us your order for Water, Air Drill, Steam, Suction and Fire HOSE, RUBBER BELTING, RUBBER PACKING and LEATHER BELTING.

The Gutta Percha Rubber and Manufacturing Company,

30 and 32 FREMONT STREET.

SAN FRANCISCO, CAL.

ASSAYERS AND CHEMISTS

WADE & WADE

Best and Oldest Establishment in Southern Cal.

115 1/2 N. Main St., Los Angeles, Cal

A. H. HANDLAN,
President and Manager

E. W. HANDLAN,
Secretary and Treasurer

M. M. BUCK MFG. CO.

Railway and Contractors Supplies

Machine Tools, Heavy Hardware and Metals; Mine, Mill, Smelter and Foundry Supplies; Manufacturers of Locomotive Head Lights; Train and Station Signal Lights, Lanterns, Oil Filters, Lubricators, Injectors, &c.

291 North 3d Street,

St. Louis, Mo.

TIMOTHY W. SPRAGUE, S. B.

WITH

CHARLES HENRY DAVIS, C. E.
CONSULTING ENGINEERS

39 Cedar St., New York 4 State St., Boston
Drexel Bldg., Philadelphia

Electric Transmission of Power and Mine Equipments

FAUTH & COMPANY,

(O. N. SAROMULLER),

Engineering and Mining Instruments.

WASHINGTON, D. C.

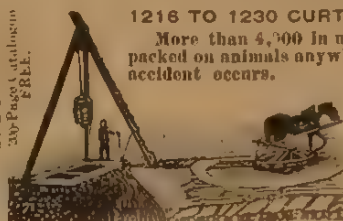
Attention is called to our newly improved Mining Transit, with best Solar Attachment and Vertical Sighting Telescope and Quick Leveling Head.

THE J. H. MONTGOMERY MACHINERY COMPANY.

1216 TO 1230 CURTIS ST., DENVER, COLO., U.S.A.

More than 4,000 in use. Made of wrought iron and steel. Can be packed on animals anywhere. The deadlock holds the load when an accident occurs.

30-Page Catalogue FREE.



Price of One-Horse Whim, complete, with shaves \$90.

Two-Horse Whims, complete, with shaves \$150.

Pumping Attachment with Pipe for either \$40.

Blower Attachment with Pipe for either \$70.

Also Four, Eight and Twelve-horsepower Whims.

All kinds of New and Second-Hand Machinery

"HENDY" IMPROVED



Triple Discharge Two-Stamp

MILL

Capacity six to ten tons per day
Price, \$450.00

JOSHUA HENDY MACHINE WORKS

38 to 44 Fremont St., San Francisco, Cal.



California Bellows Manufacturing Co.

123 Beale St., San Francisco, Cal.

MANUFACTURERS OF

BLACKSMITH BELLOWS

And Bellows of Every Description

Write us for our new Catalogue

L. Manasse Company

Mfg. Opticians

88

Nadison Street
Chicago.

Manufacturers and Importers of
Architects,
Engineers and
Surveyors
Supplies.

Optical Instruments of every description. Barometers. Thermometers. Field Glasses, etc. Catalogues on application.

IF YOU DESIRE

MINERS' TRADE

Remember the MINING and METALLURGICAL JOURNAL is the only Publication in the West devoted to the Mining Industry.

Offices—Stimson Block, Los Angeles, Cal.,
150 Nassau St., New York, N. Y.

ANTIMONY.

We buy Antimony Ore in any quantity and pay prompt CASH for same. Write us and let us know what you have.

Chapman Smelting Works Co.,
(INCORPORATED)

422 Battery Street. San Francisco, Cal

WM. M. COURTIS, A. M.

★ Mining and
Metallurgical Engineer

Assayer and Analytical Chemist

Office 312 Hammond Building,
Permanent Address, 440 4th Ave., Detroit, Mich.

JEFFREY

Roller, Steel and Special Chains.

ELEVATORS

JEFFREY

—AND—

CONVEYORS

FOR ALL KINDS OF MATERIAL OF ALL KINDS.

WIRE CABLE CONVEYORS.
For long and short distance conveying

THE JEFFREY MFG. CO. 41 DEY STREET, COLUMBUS, OHIO. NEW YORK.
Send for Catalogue.

Western Branch, - - Denver, Colorado
Frank R. Field, Manager

FOR SALE.

A 20 Stamp Mill, 4 Ore Feeders, 1 Blake Crusher, 10 Pans, 5 Settlers, 4 Frue Vanners, Howell-White Furnace, Revolving Ore Dryer, 125 h. p. Carliss Engine, 1 set Double Boilers (120 h. p.), 2 Hoisting Plants and Boilers, 1 Deep Well-Boring outfit and Assay outfit complete, located 8 miles from Railroad. Will be sold very low.

Apply Box 234.

Lordsburg, New Mexico.



Quartz Screens
A specialty. Round, slot or barred slot holes. Genuine Russia Iron. Homogeneous Steel. Cast Steel or American plan. Sheet Iron, Zinc, Copper or Brass Screens for all purposes. CALIFORNIA PATENT QUARTZ SCREEN CO. 1117 Beale St., S. F.

Diamond Prospecting Drills.

Machines of all Capacities

American Diamond Rock Drill Co.120 LIBERTY ST., N. Y.
P. O. Box 1442**The Kootenai Gold Mining District**

of British Columbia, which of late has been attracting considerable attention, is best reached by the Oregon Railroad and Navigation Co. The fact has recently been brought out that the Kootenai district contains within its borders more *High Grade Silver and Lead Mines* than any other part of the world. The recent discoveries of *Rich Gold Lodes* makes it the most attractive country for the *Capitalist Miner and Prospector* to visit in search of mines.

The Oregon Railroad and Navigation Co.
Dispatch Fast Steamers every Four Days

from San Francisco connecting at Portland, Oregon with their rail line for all points in this famous district. For full particulars address,

E. C. WARD, GENERAL AGENT.

630 Market Street, SAN FRANCISCO, CAL.

NEW HAVEN MFG. COMPANY

NEW HAVEN CONN.

IRON WORKING TOOLS,

Engine Lathes, Pulley Turning Lathes, Iron Planers, Slotters, Upright Drilling Machines, Horizontal Drilling and Boring Machines, Etc.

HENSHAW, BULKLEY & CO., Agents, San Francisco, Cal.

SMITH & THOMPSON
Manufacturers of
Fine Assay Balances

Write for Catalogue

2219 Stout street

Denver, Colo.

J. B. Pope

U. S. Mineral Surveyor,
SAN BERNARDINO, CAL.

The Giant Powder Company

* CONSOLIDATED *

Principal Office: 430 California Street
SAN FRANCISCO, CAL.

*

P. J. NOZAN, General Agent for Mexico
Apartado 730 CITY OF MEXICO.

*

A. A. SPARKS,
Resident Agent Southern California.
Room 438 Bradbury Block, LOS ANGELES, CAL.

*

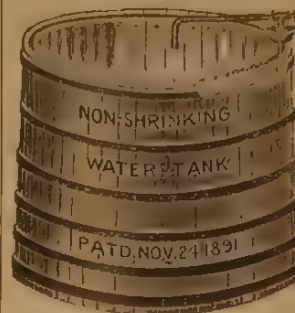
AGENTS

Roy & Titcomb, Nogales, Arizona
Samuel Hill, Prescott, Arizona
Kellner's Store, Phoenix, Arizona
Thomas Wilson, Tucson, Arizona

A. Calderon, Hermosillo, Mexico
G. Moller & Co., Guaymas, Mexico
Wohler Bartling & Co., Mazatlan, Mex.
Dellus & Co., San Blas, Mexico

Julio Hilderbrand & Co. Durango, Mexico
Julio Hilderbrand & Co., Toluca, Mexico
J. P. De Fresno, Culiacan, Mexico
T. Robison Bourne, Alamos, Mexico

Manufactures Dynamite, Black Blasting and
Sporting Powders.

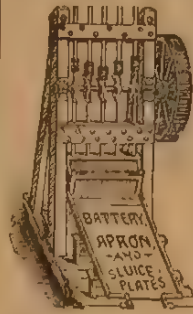
**TANKS**OF EVERY DESCRIPTION
— FOR —

Mines, Mills and Cyanide Plants
Patent Non-Shrinking Water Tanks

The only Tank that will stand the Desert
and Hot Climate.
Write for Catalogue and Estimate on any kind
of Tank Work.

Pacific Tank Co.

33 BEALE ST., SAN FRANCISCO
348 EAST 2d STREET, LOS ANGELES

**To Gold Miners!****Silver Plated Copper AMALGAMATING PLATES**

For Saving Gold In Quartz and Placer Mining.

EVERY DESCRIPTION OF MINING PLATES MADE

Only Best Copper and Refined Silver Used. Old Mining
Plates Replated. Twenty-six Medals Awarded.
Gold, Silver, Nickel, Copper & Brass Plating.

Denniston's San Francisco Plating Works

653 and 655 Mission Street, San Francisco, Cal.

Telephone, Main 5931.

E. G. DENNISTON,

Proprietor

Send for Circular.

Assaying in all its Branches.

Determinations Accurately Made

**The Bi-Metallic ...****Assay Office**

and Chemical Laboratory

R. A. PEREZ, E. M., Manager

Formerly: Chief Assayer in El Paso Smelting Works, El Paso, Texas.
Assistant Chemist Consolidated Kansas City Smelting and Refining Co.,
Argentina, Kansas.

124 South Main Street,

Los Angeles, Cal.



ESTABLISHED 1859

Herman Kohlbusch Sr.

59 Nassau Street,
New York, N. Y.

MANUFACTURER OF

Fine Balances and Weights

For every purpose where accuracy
is required.

...

Send for Illustrated Catalogue

THE WILSON
Forged High Grade Steel**Shoes and Dies**

Guaranteed to Wear Longer and Prove Cheaper than any others.
Made by use of Special Appliances. Patented Aug. 16th, 1893.

— Made only by —

WESTERN FORGE AND ROLLING MILLS
St. Louis, Missouri

JOSHUA HENDY MACHINE WORKS

SOLE AGENTS

38 to 44 Fremont Street,

San Francisco, Cal.

The JACKSON DRILL and M'F'G. CO.

PRACTICAL EXPERIENCE.

SAN DIEGO, CAL., NOV. 11, 1898

The JACKSON DRILL & M'F'G. CO.,
Denver, Colorado.

GENTLEMEN I have used two of your Hand Power Rock Drills, which gave perfect satisfaction. One man can do the work of three men, and with much less exertion, thus making a great saving in expense. No mine can well afford to be without them.

Yours respectfully,
(Signed) W. A. PTOLEMY



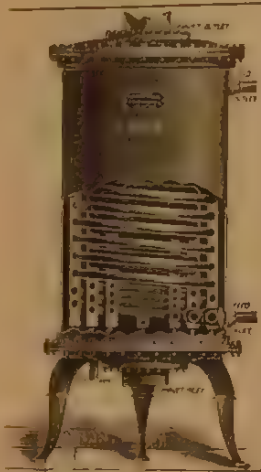
DENVER COLORADO

Dealer in

General Mining Machinery and Supplies

N. Y. Office, 120 Liberty Street,
Cable Address, "Jack Drill," New York
A.B.C. Code, (4th Ed.) and Lieber.

Send for Circulars and Testimonials



The National Feed Water Heater

Highest Premium at World's Fair

800,000 HORSE POWER IN USE

SIMPLICITY
CHEAPNESS
RELIABILITY
EFFECTIVENESS

Henshaw, Bulkley & Co.,

Agents,

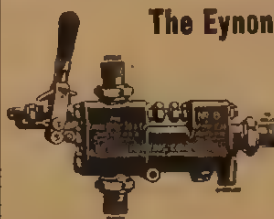
SAN FRANCISCO, CAL.

P. & B. PAINT

FOR MINES, SMELTERS, CHLORINATION WORKS,
THE CYANIDE PROCESS.

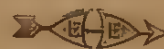
P. & B. Roofing put up in Rolls to lay 200 square feet, with Paint and Nails.
Absolutely Acid and Alkali Proof.

PARAFFINE PAINT CO., Manufacturers, 312-314 W. 5th St., Los Angeles



The Eynon-Korting Compound Injector

The Best for
Quartz Mill
and Smelter
Boilers



Brass, Bronze and Copper Castings of every description.
Send for Catalogue of the
Injectors, Condensers, Blowers, Ventilators, Blast Nozzles
Syphons, Exhausters, Etc.

THE EYNON-EVANS MFG CO.,
15th and Clearfield Streets, PHILADELPHIA, PA

ENRIQUE C. CREEL, President

JUAN A. CREEL, Manager

Compania Industrial Mexicana

— MANUFACTURERS OF —

MINING * MILLING * AND * SMELTING MACHINERY

STAMP MILLS

Engines,

Amalgamating Pans

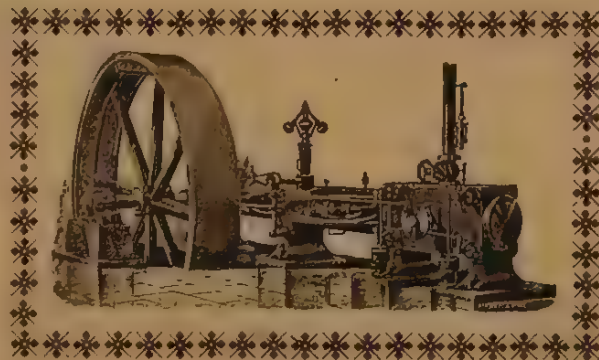
Hoists,

Huntington Mills,

Cyanide Mills,

Stamp Mill Mortars,

Air Compressors,



Crushers,

Boilers.

Amalgamating Plates, Cams Shoes & Dies

Roasters,

Electric Light Machinery.

Concentrators

Pelton Water Wheels

Water Jacket Smelters,

Pumps,

Rolls and Jigs,

Ore Cars & Slag Cars

We are prepared to meet any Prices, for Milling, Smelting and Mining Machinery
Address all communications to the Company. Correspondence Solicited.

Chihuahua,

Mexico

Why SEND YOUR MONEY EAST FOR

Shoes and Dies, Cams Tappets, Car Wheels, Shafting, Hangers, Pulleys, Ore Cars and Iron and Brass Castings, when they can be obtained for the same price and in less than half the time

AT THE

Albuquerque Foundry and Machine Works,

Repairing of Mill and Mining Machinery a Specialty, Albuquerque, New Mexico

Ores! Ores! Ores!!

Gold, Silver and Lead Ores and Concentrates

Purchased at Reduced Rates for Treatment.

Selby Smelting and Lead Co.

416 MONTGOMERY ST., San Francisco

Consign Shipments to Vallejo Junction, Cal.

MINERS' OUTFITS.



IRON MORTARS,
AMALGAM MORTARS,
GOLD WASH PANS,
MINERS' HORNS,
BATEAS, CRUCIBLES,
HORSE-SHOE MAGNETS,
MAGNIFYING GLASSES,
IRON RETORTS,
CHEMICALS, SCALES,
WEIGHTS, ETC.

Including a full assortment of Mine and Mill Supplies, Assayers' Materials, Etc.

Sole Agents for the Pacific Coast for the

W. S. TYLEE WIRE WORKS CO.

Manufacturers of

Steel and Brass Wire Battery Screens
Agents for Baker & Adamson's Chemically Pure Acids. A full Stock always on hand.

Nitric Acid, sp. gr. 1.42; Muriatic Acid, sp. gr. 1.20; Sulphuric Acid, sp. gr. 1.845.

JOHN TAYLOR & CO.

83 FIRST ST., SAN FRANCISCO
Prices on application.

The State Ore Sampling Co.

DENVER, COLORADO.

We buy Gold, Silver, Lead, Copper, Bismuth, Uranium, Wolfram, Cobalt, and Antimony Ores. With modern mills and machinery our facilities for sampling ores are the best.

Our long experience in the market enables us to pay the highest cash prices for all marketable ore. Write for our "Reference Book." Send analysis of your ore for prices and information.

BAILY & MONNIQ, Managers.

The Law of Mines and Mining in U. S.

BY D. M. BARRINGER AND
JNO. STOKES ADAMS

A Practical and exhaustive treatise covering every part of Common Law, Statutory Enactment, decisions of the Courts, and department rulings. Just the thing for the prospector, miner and mine owner. The law of mining is something that few mining men understand. The work is not at all local in character. It is as necessary to the coal and iron miner as to the miner of gold, silver, copper and lead. All the important cases connected with mining suits are carefully considered. One large octavo volume of nearly one thousand pages, bound in law sheep, delivered at any address on receipt of \$7.50. Address

LITTLE, BROWN & CO., Publishers,
254 Washington Street,
BOSTON, MASS.

RIVETED SHEET STEEL WATER PIPE

For Makers, Water Powers, Irrigation, Etc.

THE WEIGLE PIPE WORKS

2949 51/2 Spruier St. DENVER, COLO.



FACTORY:

3101-3141 Blake St., 1742-1746 Champa St., Denver, Col.

Analytical Chemists and Assayers

Analysis made of ORES, Waters, Chemicals, Clays, &c. Umpire Work a Specialty.

HAMLIN & MORRISON,

141 Chestnut Street,

PHILADELPHIA, PA.

JOHN T. REED

Assayer and Analytical Chemist

Assays made for all valuable metals. Analysis made of all valuable minerals. Special attention given to the sampling of mines. Estimating the value of and testing the nature of their ores. 100 pound lots of ore sampled, and working tests made by Cyanide, Amalgamation and Chlorination Processes.

OFFICE 522 COURT STREET,

San Bernardino, - - California

This Cut Illustrates Our
4 H.P. to 8 H.P.

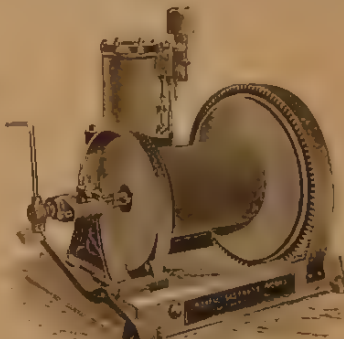
Hoisting Plant

We also build larger sizes to suit the demands of our customers.

The Hoist illustrated is designed to lift 1,000 pounds 120 feet per minute with the smaller sized engine.

It is strong and exceedingly simple and durable, being entirely under the control of the operator, by the use of a single hand lever for hoisting, while the lowering is governed by a foot lever and brake.

No better device has been designed for this purpose. For prices and further information address the builders.



ORIENTAL GAS ENGINE CO.

105 Beale Street, San Francisco, Cal., U.S.A.

WHITE, ROGERS & COM'Y.

CONSTRUCTING ENGINEERS AND MILLWRIGHTS

306 PINE STREET, SAN FRANCISCO, CAL.

Sole Pacific Coast Agents and Builders of the Celebrated

WILFLEY CONCENTRATOR,

Price \$450 f.o.b. San Francisco

One of these Machines will take the place of TWO or THREE Belt Concentrators of any make and do very much better work.



WILFLEY CONCENTRATOR

We furnish superior Machinery and erect Stamp Mills, Hoisting and Pumping Works operated by Steam or Water Motors. Complete Concentrating and Smelting Plants for the concentration and recovery of gold, silver, copper and lead. Improved Power Drills and Air Compressors, Wire Rope Tramways, etc.

The Wilfley Table is fully covered by U. S. Patents Nos. 580,338 and 590,675.

Infringements will be prosecuted to the full extent of the law.

These Machines are Kept in Stock Ready for Immediate Shipment

THE Denver Fire Clay Co

Assayers' and Chemists' Supplies

MANUFACTURERS OF

Crucibles, Scoriafiers & Muffles

And all other kinds of

Fire Clay Material.

SPECIALTIES—Strictly c. p. Acids

Test Lead, Bone Ash, Cyanide

Potash, Argol, Borax, Borax Glass

Iron Sulphides, Litharge, Soda

Mining Fluxes, etc.

Sole Agents for the

Ainsworth Balance Co

OFFICE:

E. B. HURLINGAME'S ASSAY OFFICE

Chemical Laboratory

Established in Colorado, 1868. Samples

by mail or express will receive prompt

and careful attention. Gold and Silver

Bullion refined, melted and assayed, or

purchased.

Address 1738 and 1738 Lawrence St., Denver, Col.

CLARENCE HERSEY, Assayer and Chemist,

(Established 1879)

LEADVILLE, COLORADO

Samples by Mail or Express Re-

ceive Prompt Attention

SPECIMEN ASSAY PRICES:

Gold silver and lead, \$1.00; any two of the

above, 75c; any one of above, 50c; copper analy-

sis, \$1; platinum, nickel or tin, \$5.00.

Write for full price list and mailing envelopes

\$35,000,000 in Dividends paid out by Utah Mines up to date.

UTAH MINING STOCKS

Weekly Market Report on application. Quotations by wire or mail.
Reference Any Bank in Salt Lake City.

P. J. CONWAY & CO.,

SALT LAKE CITY, UTAH

Mathematical, Scientific and Drawing Instru-



Boxwood
Scales. All
kinds of re-
pairing
promptly
executed.
GUIDE
PICKERS

S. E. Cor. 7th & Chestnut Sts. Philadelphia, Pa.

GOLD IN COLORADO

Colorado has within its limits some of the greatest gold mines that have ever been discovered. In Cripple Creek in 1892 there were a few prospector's looking over the hills; in 1896 the camp turned out over \$10,000,000 in gold. The West Creek district which is only thirty miles north of Cripple Creek is being thoroughly prospected and is one of the most inviting fields at the present time for the mines. The Denver and Rio Grande railroad has built a substantial stage road from Palmer to Lumberton which will greatly shorten the distance between Denver and the West Creek district. Leadville, the old bonanza camp and the mineral product of which made Denver what it is today, is becoming a big producer of gold. The low price of silver has driven all the men and capital who were formerly in silver mining to gold mining and the new inventions for working low grade gold ores together with the discoveries made to work rebellious ores has opened up a field for the miners such as they have never enjoyed before and Colorado has inducements to offer such as no other district in the world possesses, the record of the state in gold production for the last three years speaks for itself. Among the other prominent camps in the state are Telluride, Ophir, Rico, Silverton, Mineral Point, Durango, La Plata, Ouray, Saw Pit, Ironton, the Gunnison District and many others. New finds are being made and new camps are springing into existence every day. The Denver & Rio Grande railroad, which is the pioneer road of Colorado and which has always been the miner's friend, reaches all the mining camps in Colorado. For elegantly illustrated descriptive books, free, of mines in Colorado, send to

W. J. SHOTWELL, General Agent
314 California St., San Francisco, Cal.

S. K. HOOPER, General Passenger Agent,
DENVER, COLO.

CONGREVE Boiler Compound

WILL REMOVE SCALE
GRAISE and DIRT from
Steam Boilers without in-
jury to the steel.

The Compound is Free from Acid

Write for Circulars

Address, Congreve Boiler Compound Co.,
Lucas Avenue, St. Louis, Mo.

Third Edition Revised and Enlarged

Prospector's Field Book and Guide

In the search for and the easy determination
of another useful minerals, by H. S. Osborn, of
58 engravings, 274 pages, by mail \$1.00.

Catalogue M, Mining, Assaying, etc., sent free.
PHILADELPHIA BOOK CO.

15 S. Ninth Street, Philadelphia, Pa.

A Compendium of Gold Metallurgy

BY WADE & WADE

Send for a copy of the above book
if you are interested in Metallurgical
subjects. It gives an outline and much
of the detail of the various metallur-
gical operations employed in working
ores. Address for particulars

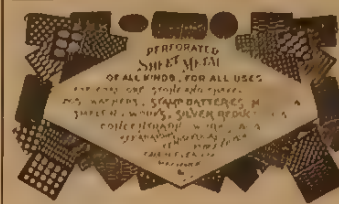
WADE & WADE.

115½ N. Main Street, Los Angeles, Cal.

GOLD and SILVER REFINERS & ASSAYERS.

Bullion Bought. No charges for parting. Gold \$20 per oz., Silver and Platinum at
market prices. Assaying in all branches. Working tests made by all processes.
Wastes and Concentrates bought. Prompt attention. Best Services.
Your Trade Solicited

PENN SMELTING AND REFINING WORKS, 901-903 Filbert St. PHILADELPHIA, PA



PERFORATED SCREENS

Steel Plate, Copper and Bronze

For all uses Send for Catalogue

A. J. BECKLEY & CO.

Works, Garwood, N. J.

New York Office, 123 Liberty Street.

Turbine
AND
Cascade

WATER WHEEL

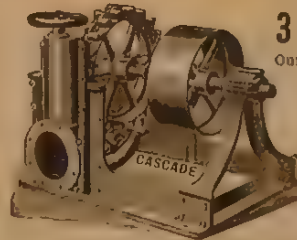
Adapted to all Heads from

3 Feet to 2000 Feet

Our experience of 33 YEARS
building Water Wheels en-
ables us to suit every re-
quirement of Water Power Plants.
We guarantee satisfaction.

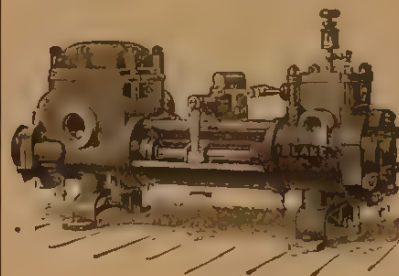
Send for a Pamphlet of
either Wheel and write
full particulars.

James Leffel & Co.
SPRINGFIELD, OHIO, U.S.A.



Geo. F. Blake Mfg. Co.

NEW YORK, N. Y.



Boiler Feed Pumps,
Tank or Light Service
Pumps,
Combined Air and Circu-
lating Pumps,
Drainage and Irrigating
Pumps,
Special Fire Pumps,
Independent Air Pumps
and Condensers

Water Works and Power Pumps.

Henshaw Bulkley & Co., Agents. San Francisco, Cal.

When Installing a Tramway Have the

Finlayson Patent Automatic Wire Rope Tramway

The Only Automatic
(Double
rope) Tramway Built

Economy
in Operation

Simplicity in
Construction

Easy
Running

THE COLORADO IRON WORKS COMPANY

ESTABLISHED 1860

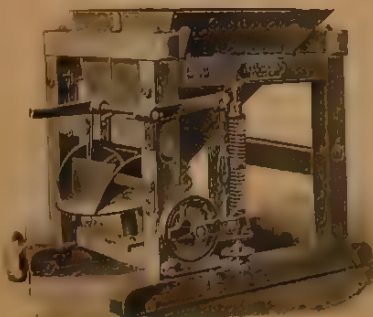
DENVER, COLORADO.

SOLE MANUFACTURERS

ENGINEERS AND MANUFACTURERS OF

Ore Milling
and Smelting
Equipments

CATALOGUE ON APPLICATION

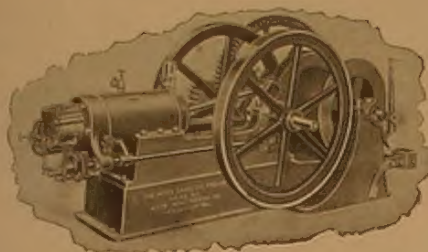


CHALLENGE ECLIPSE ORE FEEDER
Will feed both wet and dry ores



BLACK HAWK ORE BREAKER

Witte Gasoline Hoister



Uses Gas, Gasoline, Distillate, Naptha or Kerosene. Requires no Coal, Wood or Engineer and little water. Guaranteed absolutely safe, reliable and durable. Single or Double Drums, Right or Left Handed Geared or Friction.

CHAS. B. BOOTHE & CO.,
LOS ANGELES, CAL.

WITTE IRON WORKS CO.,

1201 Walnut Street,

Kansas City, Missouri

Send for Catalogue B



Engineers' and Draughtsmen's Supplies

Sole agents for Riefler's round system drawing instruments and Albert Ott's Planimeters, Planigraphs and other instruments of precision. Levels and transits of superior make.

P. WEBER & CO.,
PHILADELPHIA
1125 CHESTNUT ST.,

Subscribe for

the Journal

The M. & E. Co. MACHINERY and SUPPLIES

MINING HOISTS, WHIMS, ORE BUCKETS,

Bates Corliss Engines, Snow Steam Pumps

OIL CITY BOILERS AND ENGINES,

Hercules Gas Engines, Lawrence Centrifugal Pumps

ELECTRIC LIGHTING, RAILWAY and TRANSMISSION APPARATUS, WASHBURN & MOEN MFG. CO'S WIRES AND CABLES.



ALSO DEALERS AND JOBBERS IN

Shafting, Belting, Dodge Wood Pulleys, Hangers, Boxes, Etc.

WRITE FOR PRICES

The Machinery and Electrical Company,

351 & 353 N. Main Street,

Los Angeles, Cal.

HALLIDIE PATENT ROPEWAY

— FOR THE —

Transportation of Ore, Fuel and other material, has been erected by us all over the country and is the most economical and efficient method known. Nothing to get out of order; has always given satisfaction.

California Wire Works

[LICENSEES]

Office, 330 Market St., San Francisco, Cal.



Mention the Journal

EASTERN PRICES BEATEN IMPROVED FACILITIES, FINEST WORK
LOWEST PRICES



PERFORATED SHEET METALS

For Flour and Rice Mills, Grain Separators, Shaker Screens, Gravel and Cement, Revolving and Shot Screens, Stamp Batteries, Iron, Steel, Russia Iron, American Plating, Zinc, Copper and Brass Screens for all uses. Inventor and Manufacturer of the celebrated Slot Buried and Diagonal Slot punched Screens.

MINI-G SCREENS A SPECIALTY

Mill owners using screens extensively, can contract for large supplies at favorable rates. J. W.

QUICK is the only competent and successful manufacturer of Screens on the Coast, having furnished Screens to the Principal Mills of

California, Nevada, Alaska, Mexico, Arizona, Central America, Australia and British Possessions.

San Francisco Pioneer Screen Works

(Established 1860)

221 and 223 FIRST STREET, SAN FRANCISCO.

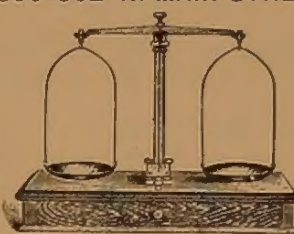
J. W. QUICK, Prop.

C. DUCOMMUN,

300-302 N. MAIN STREET,

LOS ANGELES

**Assayers Material
Mine and Mill Supplies**

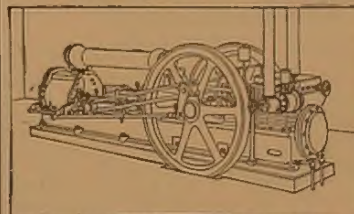


Dixon's Black Lead Crucibles, Denver Fire Clay Crucibles, Muffles, Scorifiers, etc.; Quicksilver, Drill Steel, Retorts, Mortars, Gold Pans, Drilling Hammers, Drifting Picks, Horn Spoons and Shovels.

NORWALK IRON WORKS CO.

SOUTH NORWALK, CONNECTICUT.

THE NORWALK AIR and GAS COMPRESSOR



In use in every State in the Union, Central America, and South America, Great Britain, etc.; Also used by the U. S. Army and Navy.

**Especially Designed for
Driving**

ROCK DRILLS,
PNEUMATIC LOCOMOTIVES, ENGINES, PUMPS
COAL CUTTERS.

And Other Mining Machinery. The Best Machine for Compressing Air for all Dynamic Purposes. Send for Illustrated Descriptive Catalogue.

HENSHAW, BULKLEY & CO., Agents San Francisco

HOME MANUFACTURE
FOWLER'S

Fossil Asbestos Manufacturing Co.,
Sectional Removable Covering
for Steam Boilers, Pipes, etc.
As a Non-Conductor, Unequaled
Absolutely Fire Proof

O. C. FOWLER, 656-53 Howard Street,
San Francisco, Cal.



ROFF ASBESTOS MFG. CO., Bryson Block,
Los Angeles, Cal., Agent for Southern Cal.

WIRE TRAMWAYS

Ropeways,
* Incline Planes,
and Railways.

Hoisting Apparatus, Patent Grip Polleys, Transmission of Power by Wire Ropes; 25 years experience; Send for Ropeway Pamphlet.

Pacific Coast Agents for

The Calhoun Excavator

A combined power Shovel and Cableway for excavating and handling earth or loose rock.

SEND FOR DESCRIPTIVE CIRCULARS

Buyers of

ALL FORMS OF
BULLION, MATTE,
ORE, SILVER SUL-
PHIDES,
CYANIDES, GOLD
and SILVER BARS.

CONSOLIDATED Kansas City Smelting AND Refining COMPANY

SMELTING WORKS
LEADVILLE, COLO.; EL PASO, TEXAS;
ARGENTINE, KAN.; BOQUILLAS, MEX.

REFINERY:
ARGENTINE, KAN.

ORE PURCHASING AGENCIES:
C. D. Porter, Spokane, Wash.; J. H. Weddle, Leadville, Col.;
J. H. Murray, Denver, Colo.; L. F. Peckham, City of Mex.;
J. R. Jackson, Salt Lake City, Utah; H. R. Simpson, El
Paso, Texas; C. E. Plancy, Argentine, Kansas

Manufacturers of

ALCHEMIST-
BRAND
BLUE VITROL
ZINC SULPHATE

Half Universal Radial Drills



The special features which have so highly recommended this style of Drills are our double columns, steel gearing, power and hand feeds, quick return motion to spindle. Furnished in three sizes, with large variety of tables, adapting the drills for every class of work possible.

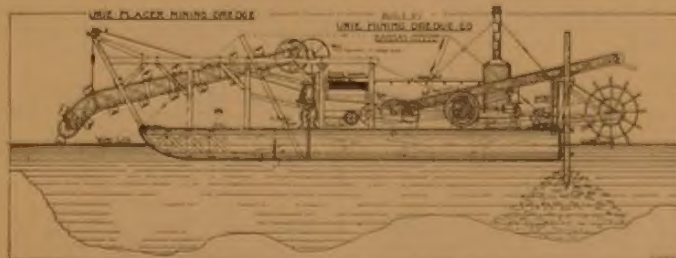
Bickford Drill and Tool Co.

CINCINNATI, OHIO, U. S. A.

HENSHAW, BULKLEY & CO., AGENTS

San Francisco, Cal.

PLACER MINING DREDGES



Adapted to all classes of work, any capacity. We built first mining dredge in use.

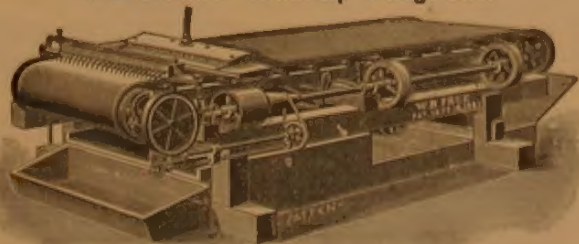
URIE MINING MACHINERY CO.

907 W. 6th Street,

Kansas City, Mo.

FOUR and SIX FOOT FRUE VANNERS

With Brownell "Patent Lip" Flange Belts



After a Concentrator like the Frue Vanner has been on the market nearly two decades, and the sales have constantly increased, it is safe to say it is the "Standard Machine of the world." More Frue Vanners have been sold during the last twelve months than for the same period at any time during the history of the machine. Practical mining men in all parts of the world where mining is carried on will testify as to its merits. It is the "Standard" which all competitors are trying to imitate.

The results obtained by this machine are the "Acme" of concentration, and several cheap and untried machines that have lately come on the market compare by it, and the manufacturers will tell you that they are "just as good, and cheaper, etc." The facts are that no other concentrator made has an equal capacity, or will yield as clean a concentrate with as small loss in the tailings as the Frue Vanner. The amount saved from the lower first cost of an inferior machine counts little in the years results, when compared with the increased output from a Frue. This machine not only gives better results at both ends of the belt (i.e. Clean product and poor tailings), but is operated at less expense and requires less attention than any other machine on the market. At the Alaska Tradiwell Mine where they have ordered over 100 Frue Vanners one man attends 18 machines for 24 hour shift.

FOR DESCRIPTIVE PAMPHLETS, ADDRESS

JAMES S. BROWNELL, Western Agent
132 Market Street,

FRUE VANNING MACHINE CO.

(Successor to Adams & Carter)

SAN FRANCISCO, CAL.

Randsburg Gold Fields REACHED VIA Santa Fe Route

Leave Los Angeles, 10:20 a. m.
Leave San Bernardino 12:10 p. m.
Arrive Randsburg 3:15 p. m.
Leave Randsburg 3:50 p. m.
Arrive Kramer, 5:00 p. m.
Arrive St. Elmo, 6:15 p. m.
Arrive Johannesburg 6:50 p. m.

Returning Trains Leave
Johannesburg 9:00 p. m.
Arrive San Bernardino 11:35 a. m.
Arrive Los Angeles 1:30 a. m.

A through passenger coach is run between Randsburg and Johannesburg.

Through tickets and particulars of any Santa Fe Route Agent.

Stage leaves Johannesburg for Ballarat on Sundays and Thursdays at 7 a. m.; returning arrivals at Johannesburg on Tuesdays and Fridays at 8 p. m.

SAN FRANCISCO OFFICE
628 MARKET ST.

LOS ANGELES OFFICE
200 S. SPRING ST.

ESTABLISHED 1887

C. L. BERGER & SONS

SUCCESSORS TO

BUFF & BERGER



Surveying and
Engineering Transits

With patent interchangeable auxiliary. Telescope for use on top or side in vertical sighting. Our friends are cautioned against imitations foreign or domestic as attempts have been made of late to mislead the public.

Send for Illustrated Catalogue and Manual

11 Province Court, Boston, Mass.

F. A. JONES, E. M.
MINING ENGINEER

Assays, Surveys, Reports, Plans, Etc., Chemist

State Geologic Survey.

OLIVER W. KRELL, Mining Engineer Asst.

OFFICE AND LABORATORY

14 W. Missouri Ave., Kansas City, Mo.

A Stamp Mill ★

Especially adapted for the prospector who requires something Cheap, Strong, Light, Efficient, and that will save the values.

Price \$300.00

The Stokesberry Rotary Stamp Mill

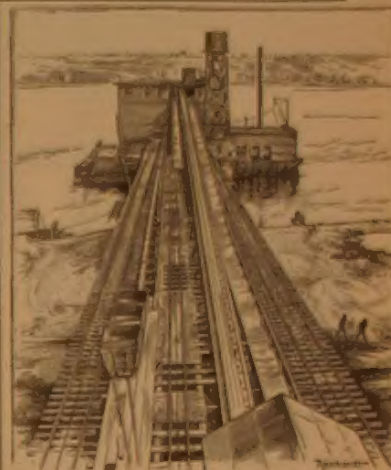
Enterprise Machine Works,

1738 Blake Street, Denver, Colo.

SWEEPINGS ★

Metallic Wastes, Dental Scraps, Photographers' Wastes, Jewelers' Sweeps, Mill Wastes, Amalgamated Plates, Old Iron Refractories, Old Quicksilver Receipts.

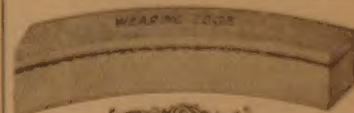
1061 Larimer St., Denver, Colorado



FOR conveying Ore, Coal
Slag and Matte. Send
full particulars of your
wants in writing for prices.

Robins Conveying Belt Co.,
107-109 CEDAR STREET, NEW YORK

GOODSELL'S "98" PUMP PACKING



WAX END SEWED.

Patent Pending

No possibility of Splitting. All imperfect features of Duck packing overcome. Price 75c lb net.

Goodsell Packing Co.,

33 South Canal Street Chicago, Illinois

J. W. McCOY,
Consulting Mining Engineer.

1202 Owings Building, Chicago, Ill.

Examinations and Reports on Mining Properties

Horace F. Brown, M. E.

Mechanical Roasting, Cooling and
Conveying of Ores. Automatic
milling plants adapted to
standard processes.

DESERT ADDRESS, YUKON, COLORED

CREATY OF THE TRADE.

The JOURNAL's advertising pages represent the cream of the trade, and nearly everything needed by miners, millmen and smelters can be found in them; in fact they constitute the best directory published in the West of mining machinery manufacturers.

THE PUEBLO Smelting and Refining Company,

PUEBLO, COLORADO.

BUYERS OF
Gold, Silver, Lead and Copper Ores,
Copper Matte and Bullion.

Refiners of Gold, Silver, Lead and Copper.

Manufacturers of Bar and Pig Lead, Lead Pipe, Antimonial Lead, Copper Ingots,
Granulated Test Leads and Litharge.

Pays Highest Prices for all classes of Ores.

Especial Attention to Sampling by most Approved Processes.

Quick Returns on all Consignments.



CHAS. B. BOOTHE & CO.
MINING AND MILLING MACHINERY AND SUPPLIES,

Hoists, Horse Whims, Buckets, Wire Rope, Ore Cars

129 SOUTH LOS ANGELES STREET,

LOS ANGELES, CAL

RISDON IRON WORKS,

SAN FRANCISCO, CALIFORNIA

Cable Risdon's, Code—A. B. C. & Leibers

MANUFACTURERS OF

**GOLD DREDGING MACHINERY AND COMPLETE
EQUIPMENT** for Placer Mines, OUR SPECIALTY.

We build Gold Dredges Complete in Running Order to handle 2,500 cubic yards per day
at a cost of 3 cents per cubic yard.

We excavate 50 feet below water, 20 feet above water and handle boulders up to
one ton weight. Send for Dredging Catalogues Nos. 15 and 16.

We also build all kinds of Mining, Milling Concentrating, Pumping, Air Compressing,
Hydraulic, Water Wheel and Hoisting Machinery.

EVANS' HYDRAULIC GRAVEL ELEVATORS.

We publish 16 Catalogues. Write for one in the line you are interested in.



Highest Known Grade of Cyanogen

CYANIDE OF POTASSIUM

GUARANTEED 99 PER CENT. AND OVER. IN 112-LB ZINC LINED CASES.

MADE BY **THE GAS LIGHT AND COKE CO.,**

Works at BECKTOWN near LONDON, ENGLAND,

FOR PRICES
ADDRESS

Schoellkopf, Hartford & MacLagan, Ltd., Sole American Agents

No. 3 Cedar Street, NEW YORK CITY



FRASER & CHALMERS

Mining Machinery

{ 133 Fulton Street,
Chicago, Illinois, U. S. A.
{ 43 Threadneedle Street,
E. C., London, England

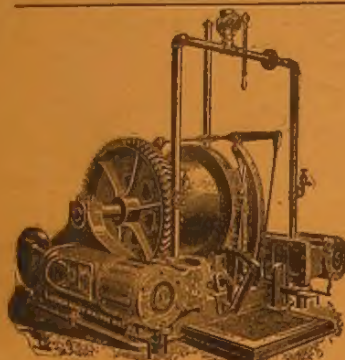
STAMP MILLS
ROCK CRUSHERS
HUNTINGTON MILLS
SMELTING FURNACES
GRAY'S PATENT
MINE CHAIRS

CONCENTRATORS
HOISTING ENGINES
ROASTING FURNACES
BALL PULVERIZERS

CORLISS ENGINES
SEDERHOLM BOILERS
RIEDLER PUMPS
RIEDLER AIR COMPRESSORS
PERFORATED METALS
A SPECIALTY

The accompanying picture shows our Improved Adjustable Comet Crusher.

Fraser & Chalmers, GENERAL AGENTS FOR GREEN BLOWERS



DOUBLE CYLINDER HOISTING ENGINE

JOSHUA HENDY MACHINE WORKS, Nos. 38 to 44 Fremont St.

SAN FRANCISCO, CAL.

(Manufacturers of and Dealers in

The Latest Improved

Quartz Milling, Pumping, Hoisting and Smelting
Plants, Air Compressors and Rock Drills.

"HENDY" IMPROVED "TRIPLE-DISCHARGE" TWO-STAMP QUARTZ MILLS
Boilers, Engines & Pumps of all capacities

PLANS, SPECIFICATIONS and ESTIMATES OF COST SUBMITTED and CONTRACTS ENTERED INTO
FOR FURNISHING and ERECTING MINING and MILLING PLANTS for all conditions of Use.

BAKER IRON WORKS

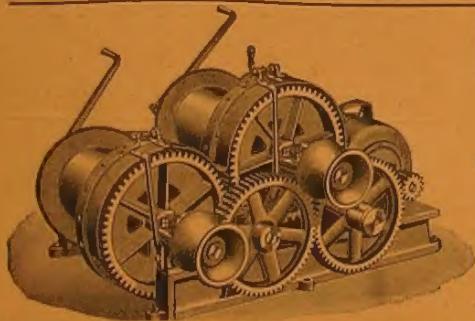
LOS ANGELES, CALIFORNIA

Manufacturers of

Mining and Milling Machinery, Atlas Engines and Boilers, Worthington Steam Pumps



Water Works Machinery
A SPECIALTY



LAMBERT HOISTING ENGINES

ELECTRIC HOISTS
BUILT TO CAUCES AND TEMPLATES
500 STYLES AND SIZES

Prospectors and Contractors Engines | Mining Engines and Electric Hoists.
Single and double drums with | with single, double or triple drums.
and without boilers. | Friction or reversible.

SEND FOR NEW CATALOGUE R, 140 PAGES.

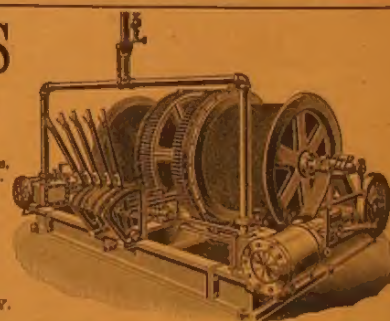
LAMBERT HOISTING ENGINE CO.

MAIN OFFICE AND WORKS:

117 POINIER ST., NEWARK, N. J.

117 Main St., CAMBRIDGEPORT, MASS.

143 Liberty St., N. Y.



Mining Timbers and Construction Lumber

(California Long Leaf Yellow Pine Lumber)

Prices given for delivery to any point in Mexico by Rail through Porfirio Diaz, Nuevo Laredo or Paso del Norte, and by Vessel through Gulf Ports of Tampico and Vera Cruz.

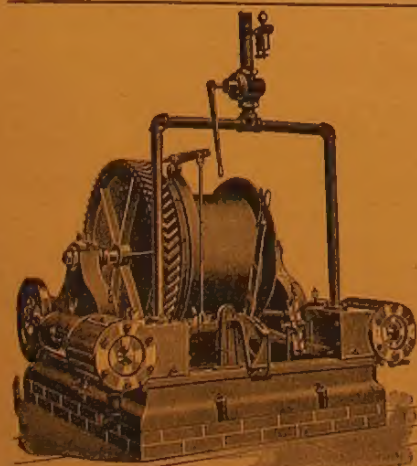
Bradley-Ramsay Lumber Co.

LOUISIANA, U. S. A.

ADDRESS INQUIRIES FOR PRICES TO

R. N. WATSON, AGENT.

APARTADO NO. 118 MONTREY, N. L. MEXICO



PARKE & LACY COMPANY

21 and 23 Fremont St., San Francisco, Cal.



MINING MACHINERY

THE INGERSOLL-SERGEANT AIR COMPRESSORS AND ROCK DRILLS.

SOLE LICENSEE FOR THE MANUFACTURE AND SALE OF

THE ROPP STRAIGHT LINE FURNACE, For Roasting, Chlorinating and Desulphurizing Ores.

WE CARRY IN STOCK

Horizontal, Vertical and Portable Engines and Boilers. Rock Breakers, Cornish Rolls, Pulverizers, Concentrators, Ore Feeders. Hoisting Engines, Horse Power Hoisting Whims, Water Wheels, Steam Pumps, Ore Cars, Wire Rope, Ore Buckets, Water Buckets, Skips. Blowers and Exhaust Fans, Shafting and Pulleys, Belting, Oils and Mine Supplies. Maganese Steel Shoes and Dies

Estimates Furnished for Complete Plants for Hoisting Works, Smelters, Concentrating and Stamp Mills.